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AIR POLLUTION ABSTRACTS

27294-28159

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Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author an asterisk precedes the Abstract Number.	

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Feedback from our users, including suggestions of articles for abstracting, are always welcome.

APTIC Publications

- Odors and Air Pollution: A Bibliography with Abstracts**, October 1972, GPO No. EP 4.9:113, \$3.00.
- Mercury and Air Pollution: A bibliography with Abstracts**, October 1972, GPO No. EP 4.9:114, \$1.25.
- Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts**, July 1972, GPO No. EP 4.9:110, \$1.25.
- Air Pollution Aspects of Emission Sources: Iron and Steel Mills - A Bibliography With Abstracts**, May 1972, GPO No. EP 4.9:107, \$1.00.
- Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts**, May 1972, GPO No. EP 4.9:105, \$2.00.
- Hydrochloric Acid and Air Pollution: An Annotated Bibliography**, July 1971, GPO No. EP 4.9:100, \$0.55.
- Chlorine and Air Pollution: An Annotated Bibliography**, July 1971, GPO No. EP 4.9:99, \$0.55.
- Air Pollution Aspects of Emission Sources: Electric Power Production - A Bibliography With Abstracts**, May 1971, GPO No. EP 4.9:96, \$2.25.
- Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts**, May 1971, GPO No. EP 4.9:95, \$0.50.
- Air Pollution Aspects of Emission Sources: Sulfuric Acid Manufacturing - A Bibliography With Abstracts**, May 1971, GPO No. EP 4.9:94, \$0.65.
- Air Pollution Aspects of Emission Sources: Nitric Acid Manufacturing - A Bibliography With Abstracts**, May 1971, GPO No. EP 4.9:93, \$0.45.
- Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts**, May 1971, GPO No. EP 4.9:92, \$1.00.
- Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes)**, March 1971, GPO No. EP 4.9:88, \$6.25.
- Beryllium and Air Pollution: An Annotated Bibliography**, February 1971, GPO No. EP 4.9:83, \$0.40.
- Asbestos and Air Pollution: An Annotated Bibliography**, February 1971, GPO No. EP 4.9:82, \$0.50.
- Municipal Incineration: A Review of Literature**, June 1971, GPO No. EP 4.9:79, \$1.00.
- Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes)**, October 1970, GPO No. HE 20.1309:75, \$5.00.
- Nitrogen Oxides: An Annotated Bibliography**, August 1970, GPO No. HE 20.1309:72, \$2.75.
- Air Pollution Translations: A Bibliography With Abstracts Volume I**, May 1969, GPO No. FS 2.93/3:56, \$1.75.
- Air Pollution Translations: A Bibliography With Abstracts Volume II**, April 1970, GPO No. HE 20.1309:69, \$1.00.
- Carbon Monoxide, A Bibliography With Abstracts**. 1966, GPO No. PHS 1503, \$2.50.

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RECENT CONTRACT AWARDS

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Durham Contract Operations Contracts Management Division, EPA

Contract No. 68-02-1081, RFP No. Du-72-A217.....	\$973,052
REGIONAL AIR POLLUTION STUDY. Rockwell International Corporation, P. O. Box 1085, Thousand Oaks, California 91360	
Contract No. 68-02-0766, RFP No. Du-73-B366	\$29,057
EVALUATION OF A REMOTE PASSIVE TECHNIQUE BASED ON GAS CELL CORRELATION SPECTROSCOPY. Philco-Ford Corporation, Aeronutronic Division, Ford Road, Newport Beach, California 92663	
Contract No. 68-02-0718, RFP No. Du-73-B307	\$211,600
EFFECTS OF PESTICIDES ON HUMAN HEALTH (ARIZONA). The University of Arizona, College of Agriculture, Department of Entomology, Tucson, Arizona 85721	
Contract No. 68-02-1080, RFP No. Du-72-A217.....	\$4,980,000
REGIONAL AIR MONITORING SYSTEM. Rockwell International Corporation, P. O. Box 1085, Thousand Oaks, California 91360	
Contract No. 68-02-1071, RFP No. Du-73-A024.....	\$482,000
STUDY OF SODIUM-CALCIUM ALKALI REGENERATION FOR CONTROL OF SULFUR OXIDES IN BOILER FLUE GASES. Arthur D. Little, Inc., 20 Acorn Park, Cambridge, Massachusetts 02140	
Contract No. 68-02-0771, RFP No. Du-73-B365	\$32,133
THE STUDY OF FORMATION OF AEROSOLS IN GAS REACTIONS IN A FLOWING STREAM. Rockwell International Corporation, Science Center, 1049 Camino Dos Rios, Thousand Oaks, California 91360	
Contract No. 68-02-0782, RFP No. Du-73-B413	\$49,000
ADVANCED PROTOTYPE DIRECT READING INSTRUMENT FOR PARTICULATE MASS MEASUREMENT. Industrial Nucleonics Corporation, 650 Ackerman Road, Columbus, Ohio 43202	
Contract No. 68-02-0760, RFP No. Du-73-B388	\$161,900
FEASIBILITY OF METRAC SYSTEM FOR REGIONAL AIR POLLUTION STUDIES. Control Data Corporation, 8100 34th Avenue, South, Minneapolis, Minnesota 55420	

Contract No. 68-02-1136, RFP No. Du-73-C797 \$56,733
DUPLICATING OF MICROFICHE.
Information Systems, Inc., 9211 Bedford, Omaha Nebraska 58134

Contract No. 68-02-0584, Modification No. 3..... \$142,695
DEVELOPMENT AND FABRICATION OF A SIMULATED STATIONARY SOURCE
EXPERIMENTAL FACILITY.
Acurex Corporation, Aerotherm Division, 585 Clyde Avenue, Mountain View, California
94040

BOA No. 68-02-1008, Order No. 1..... \$34,963
UPDATING AND UPGRADING AREA AND POINT SOURCES IN THE STATE OF
NEW YORK.
IBM, 18100 Frederick Pike, Gaithersburg, Maryland 20760

Contract No. 68-02-0638, Modification No. 2..... \$151,442
COMPREHENSIVE DATA HANDLING SYSTEM.
IBM Corporation, 18100 Frederick Pike, Gaithersburg, Maryland 20760

BOA No. 68-02-1001, RFP No. Du-73-A102..... \$32,000
UPDATING AND UPGRADING AREA AND POINT SOURCES INVENTORIES FOR
KANSAS, NEBRASKA, AND IOWA.
PEDCo-Environmental Specialists, Suite 8, Atkinson Square, Cincinnati, Ohio 45246

Contract No. 68-02-0540, Modification No. 4..... \$241,500
COMMUNITY STUDY PROJECT ON THE EFFECTS OF PESTICIDES USE ON
PUBLIC HEALTH.
State of New Jersey Department of Health, P. O. Box 1540, Trenton, New Jersey 08625

BOA No. 68-02-1002, RFP No. Du-73-A100..... \$32,616
NATIONWIDE EMISSION INVENTORY OF POINT SOURCES.
Walden Research Corporation, 359 Allston Street, Cambridge, Massachusetts 02139

Contract No. 68-02-0294, Modification No. 2..... \$102,625
TECHNICAL SERVICES FOR LABORATORY RESEARCH, ANALYSIS OF STATE IM-
PLEMENTATION PLAN PROGRESS, AND ANALYTICAL RESEARCH STUDIES.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-1077..... \$74,967
INVESTIGATION OF OZONE AND OZONE PRECURSOR CONCENTRATIONS AT
NONURBAN LOCATIONS IN EASTERN UNITED STATES.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

BOA No. 68-02-1007, RFP No. Du-73-A103..... \$29,875
UPDATING AND UPGRADING AREA AND POINT SOURCES INVENTORIES FOR
NEVADA, HAWAII, ALASKA AND OREGON.
TRW, Inc., 7600 Colshire Drive, McLean, Virginia 22101

Contract No. 68-02-0758, RFP No. Du-72-B489 \$2,138,606
DEVELOP, EVALUATE, INSTALL, AND OPERATE SYSTEMS FOR THE COMMUNI-
TY HEALTH AIR MONITORING PROGRAM (CHAMP).
Rockwell International Science Center, 1049 Camino Dos Rios, Thousand Oaks, California
91360 (NOTE: Contract has two options for additional monitoring stations: Options 1 for
25 stations - \$1,568,822; Option 2 for 35 stations with a unit cost of \$67,264)

Contract No. 68-02-0767, RFP No. Du-73-B378 \$118,200
STUDY OF EFFECTS OF LOW LEVEL EXPOSURE TO CARBON MONOXIDE.
The University of North Carolina, Chapel Hill, North Carolina 27514 (NOTE: The contract
contains an option for an additional effort with a value of \$70,000)

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1973

27294

APTIC NO. 49108

Tokyo Metropolitan Government (Japan), Bureau of Environmental Protection

THE SECOND PROGRESS REPORT ON THE GENERAL INVESTIGATION ON PCB IN THE TOKYO METROPOLITAN AREA. (Tokyo-to PCB sogo chosa daikirai chokan hokoku). Text in Japanese. Jan. 1973. 24p.

A progress report covering the period between Aug. and Dec. 1972 is presented. The major part of the report has to do with the measurements of polychlorinated biphenyl (PCB) content in factory effluents. Investigations on air pollution by PCB are still in progress. As one of possible emission sources, stack gases from the Chitose Sanitation Plant incinerator were analyzed. The results of three tests were all negative. Further tests will be given to other sanitation plants. At 11 sewage and waste treatment plants in the basin of the Tama River in suburban Tokyo, liquid waste, incinerator ashes, and the waste water from a stack gas scrubber were also analyzed. No trace of PCB was found from the scrubber water of the stack gas treatment.

27295

APTIC NO. 49586

Bigga, Eckhard

DUST MEASUREMENTS IN THE AUSTRIAN GRANITE INDUSTRY - A CONTRIBUTION TO THE QUESTION OF EVALUATING DUST CONCENTRATIONS AT WORKING PLACES OF COMPARABLE ENTERPRISES ACCORDING TO RESULTS OF MEASUREMENTS IN THE INDIVIDUAL PLANT. (Staubmessungen in der oesterreichischen Granitindustrie - Ein Beitrag zur Frage der Beurteilung von Staubkonzentrationen an Arbeitsplaetzen vergleichbarer Betriebe nach Messergebnissen aus einem Einzelbetrieb). Text in German. Staub, Reinhaltung Luft, 33(2):71-74, Feb. 1973. 7 refs.

A Konimeter was used to measure dust concentrations in the granite industry. A general assessment of hygienic conditions was made which could be applied to similar working places of the granite industry. This relationship was used to prove the validity of long-term assessments of hygienic conditions at working places according to the results of individual short-term investigations. The Konimeter samples were counted under a light microscope. Air samples as well as sedimented dust samples were taken. From these samples the grain size fraction with a diameter of less than 5 micron was separated by the familiar sedimentation process. No marked differences were found between the aerosol samples and the sedimented dust samples. The quartz concentration in the dust samples with a grain size of less than 5 micron was always somewhat lower than in the ground stone samples. This can be explained by the fact that through the processes the quartz lattice in the crude material is changed which leads to a different quartz concentration in the aerosols.

27296

APTIC NO. 49251

Dubin, Fred S.

A WISER USE OF ELECTRICITY AND ENERGY CONSERVATION THROUGH BUILDING DESIGN. Bldg. Systems Design, 70(1):8-14, Jan. 1973.

Currently heating, ventilating, air conditioning, power, lighting, and hot water for residential and commercial buildings consume about 33% of the primary energy resources consumed annually. The same systems also consume a portion of the 31% of energy use attributable to industry. A reduction of at least 40% in the total national energy consumption is possible through a building design program to reduce environmental requirements (e.g., illumination, ventilation); select building sites and design building structures in a manner which will minimize energy consumption; avoid oversizing equipment; select electrical systems which use less energy for a given task; employ heat-conservation methods; use building materials which require less energy for their production; improve maintenance practices; and design multi-use buildings. These measures are all part of a systems approach to energy conservation through building design. Adoption of the approach could lead to savings of more than the equivalent of 14 billion barrels of oil in 10 years and a reduction of more than 8 million tons of pollutants each year.

27297

APTIC NO. 49277

Gasparovic, N.

OXIDES OF NITROGEN IN THE GAS TURBINES: FORMATION AND COUNTERMEASURES. (Stickoxide in den Gasturbinen: Bildung und Gegenmassnahmen). Text in German. Brennstoff-Waerme-Kraft, 25(1):1-6, Jan. 1973. 17 refs.

After a review of the toxicology and the emission of pollutants such as carbon monoxide, unburned hydrocarbons, and oxides of nitrogen by gas turbines, the inadmissibly high emission of oxides of nitrogen is discussed. A discussion of the kinetics of the oxides of nitrogen formation and of the influencing factors provides information on where to aim the countermeasures. Because of the dominating influence of temperature on the formation of the NO_x, the preventive efforts must be directed toward achieving a uniform temperature distribution and low maximum temperatures with a short residence time. A uniform temperature distribution is achieved by uniform distribution of the fuel, the air, and the combustion gases which requires an optimum burner and an optimum geometry of the primary zone. This also guarantees a good combustion so that the residence time may be short. The residence time can be shortened by shortening the hot gas zone or the reaction zone. The maximum temperature can be lowered by the use of a lean mixture (lambda less than one), by reducing the temperature at the combustion chamber entrance, by the addition of water or steam, by waste gas recirculation.

27298

APTIC NO. 49088

Geiringer, Stefan L.

TAUNTON MUNICIPAL LIGHTING PLANT. Combustion, 44(7):28-30, Jan. 1973.

Cost data are given for a custom-designed, field-erected 110 mw combined cycle plant designed to operate on low sulfur fuel. Total construction costs were \$15,580,000 or \$142/kw.

Annual fuel costs will be approximately \$700,000 less than for a packaged combined cycle unit operating on light oil or heavy distillate. Maintenance costs will also be substantially lower at the custom-designed plant, as only one turbine is employed and this is shut down only for scheduled maintenance. Most packaged plants have two or more turbines that must be shut down at various design capacities to maintain efficient heat rate. The 20-mw gas turbine in the custom-designed unit exhausts 870-deg gases into a high-pressure 570,000 lb/hr steam boiler. The utility-type boiler utilizes these hot gases for combustion air and delivers 1800 psig 1000 F steam to a 90-mw reheat steam turbine. Low-sulfur fuel oil is fired in both the boiler and gas turbine. Preparation of the fuel oil for use in the gas turbine required installation of a washing system for removing alkali metals. This is complemented by a fuel-oil additive system for controlling vanadium deposits.

27299

APTIC NO. 49149

Gieck, J. F.

HYDROGEN AS A FUEL SOURCE. *Gas*, 49(2):46-47, Feb. 1973.

A low-Btu hydrogen or a hydrogen-rich mixed gas can be produced from coal. The gas can be manufactured at the coal mine and marketed at the nearest urban and industrial centers by blending with allocated supplies of pipeline natural gas. For example, a 434-Btu/scf mixed gas and a 1000-Btu/scf natural gas can be blended one vol to two vol to produce an 810-Btu/scf gas, which could be priced at 34 cents/Mscf. A proposed process for manufacturing hydrogen-rich (81.2 mol%) 434.5 Btu/scf gas from one ton of coal involves reacting the coal with steam and oxygen in a simple reactor. The process includes hot potash systems for carbon dioxide and hydrogen sulfide removal, high-temperature shift converters for carbon monoxide, and sulfur recovery units for producing elemental sulfur. High-Btu gas can be produced from the raw product gas by adding a methanation step to the product; however, this will reduce the available heat in the gas by 11.7%. An additional application for the low-Btu gas is blending with propane or butane for use as a standby fuel. A blend of 82% hydrogen-rich 435 Btu/scf gas and 18% propane vapor or 13.3% butane will produce an 810-Btu/scf gas. Use of 810-Btu gas instead of 1000-Btu gas will require minor adjustment on the part of consumers as the total volume of fuel gas/1000 Btu of heat released is almost identical for the two gases.

27300

APTIC NO. 49112

Koponen, Matti

MEASUREMENT OF THE CONCENTRATION OF SILICOGENIC DUSTS AND DUST HAZARDS IN THE FINISH STONE INDUSTRY. (*Messung der Konzentration silikogener Staube und Staubgefahren in der finnischen Steinindustrie*). Text in German. *Staub, Reinhaltung Luft*, 33(2):75-76, Feb. 1973.

Measurement methods for different dust concentration ranges are discussed. The effect of dust removal by suction was investigated. Despite the fact that the maximum allowable concentration value of 0.2 mg/cu m was frequently exceeded, the number of asbestosis cases in the mineral processing industry was lower than expected because of the usual changing of working places. Dust was sampled with membrane filters at an air throughput of about 2 l/min. From the dust samples the fraction below 5 micron was separated by sedimentation in alcohol. Afterwards the quartz concentration was determined by X-ray diffraction. The fine dust fraction of red granite had an average quartz concentration of 31%, of gray granite 27%, and of black granite 12%.

27301

APTIC NO. 49077

Kuhlmann, Albert and Reinrich Waldeyer

STRATEGIC AND ECONOMIC QUESTIONS OF THE REFUSE TREATMENT. (*Strategische und wirtschaftliche Fragen der Müll- und Abfallverwertung*). Text in German. *Muell Abfall*, 5(1):7-11, 1973.

AIR POLLUTION ABSTRACTS, JUNE 1973

The annual refuse quantity is estimated to amount to about 260 million tons. About 78% of this is dumped onto 50,000 uncontrolled deposit sites. About 2% of the refuse is treated in 16 composting plants, and about 4 million tons of refuse are burned in 30 refuse incineration plants annually. In 1970 about \$200 million had to be spent for the removal of the domestic refuse quantity. The most effective volume reduction of the refuse is achieved by incineration, a method which is problematic owing to the emission of harmful gases. Dust emissions from small incineration plants were 10 times as high as those from large plants. Since the development of harmful gases depends on the composition of the refuse, it is necessary to control it continuously in order to undertake preventive measures if required. However, filters, scrubbers, and absorption and catalytic afterburning procedures have been developed so that the emission of harmful gases can be considerably reduced.

27302

APTIC NO. 49496

Kurosawa, Toshio, Tetsuo Yagihashi, Koji Togo, and Toshio Kato

ON THE SEVERAL PROBLEMS OF DUST IN THE COPPER SMELTING. (*Jiyoro narabi ni tenro enkai ni kansuru 2, 3 no mondai*). Text in Japanese. *Nihon Kogyo Kaishi (J. Mining Met. Inst. Japan)*, 89(1020):107-112, Feb. 1973. 9 refs.

Dust emissions from the copper smelting process were investigated with respect to dust composition, distribution correlated with process stage, thermal changes, and the effects of the Cottrell device. In the flash smelting stage, the boiler and cyclone dusts were rich in copper, iron, silicon, and nickel and poor in arsenic, antimony, lead, zinc, bismuth, and indium. Sulfur content was generally unchanged. In the converter dusts, Cu, Fe, Si, Ni, and S were rich on the converter side, while Pb, Zn, and As increased at the remote position. Concentrations of Sb, Bi, and tin were almost constant. X-ray analysis determined the presence of iron oxide, lead sulfate, copper sulfide, lead sulfide, arsenic oxide, and antimony oxide in the flash furnace dust and the presence of zinc sulfate and lead sulfate in the converter dust.

27303

APTIC NO. 49319

Lueckel, W. J., L. G. Eklund, and S. H. Law

FUEL CELLS FOR DISPERSED POWER GENERATION. *IEEE (Inst. Elec. Electron. Engrs.) Trans. Power App. Systems*, 92(1):230-236, Jan./Feb. 1973. 6 refs. (Presented at the Institute of Electrical and Electronics Engineers, Winter Meeting, New York, Jan. 30-Feb. 4, 1972, Paper T 72 235-5.)

The design, operational characteristics, applications, and potential economic, operational, and social benefits to the electric utility industry of fuel cell powerplants are reviewed. Exhaust emissions of nitrogen oxides, hydrocarbons, sulfur oxides, and particulates for both the base load and peaking load configurations are estimated at less than 1/10 of those from a modern gas-fired central station (0.0003 lbs/1000 kw/hr for sulfur dioxide, 0.24 for nitrogen oxides, 0.23 for hydrocarbons, and 0.0003 for particulates). Automatic operation provides flexibility for use in a variety of duty cycles and applications. Modular construction results in shorter lead time and permits factory assembly and tests, thus reducing construction costs and improving quality control. By placing the fuel cell powerplants in dispersed locations, overall system reliability can be improved. Costs for fuel cells are compared with costs for gas turbine, nuclear, and fossil fuel power. (Author conclusions modified)

27304

APTIC NO. 49768

Luescher, K. H.

MEASURES FOR AVOIDING PIPE EROSION IN INCINERATORS. (*Massnahmen zur Vermeidung von Rohrabzehrungen in Muellkesseln*). Text in German. *VGB Kraftwerkstechnik*, 53(2):87-93, Feb. 1973. 6 refs.

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Pipes in incinerators are subject to corrosion and erosion. Corrosion is the chemical attack of flue gases on the pipes at higher temperatures (low-temperature corrosion is not considered). Such corrosion occurs in incinerators primarily in the combustion chamber and in the first flue. The evaporator, superheater, or intermediate superheater with wall temperatures between 350 and 550 C are mostly affected. All corrosion on pipes of incinerators burning domestic refuse is due to reactions with chlorine compounds. Erosion is caused by the ash components in flue gases. Erosion occurs increasingly after points of deflection of the flue gas and at points of high flue gas speed. Preventive measures against corrosion and erosion start with the design of incinerators, particularly a sufficiently large design is important to avoid overloading of the combustion chamber which leads to a lack of air. Homogenizing of the refuse and smooth supply of the waste into the combustion chamber are also important preventive measures. The secondary air has an important influence on the prevention of corrosion. The oxygen concentration of the flue gases shall not drop below 8 to 9%. The incinerator Munich North has been in operation for 32,500 hours and burned 870,000 tons of waste. Apart from erosion corrosion caused by the soot blower, no damage has yet occurred which proves that incinerators can be operated without major pipe damage.

27305

APTIC NO. 49749

Meyer, Peter B.

DUST MEASUREMENTS IN DUTCH IRON FOUNDRIES. (*Staubmessungen in der holländischen Eisengießereiindustrie*). Text in German. *Staub, Reinhaltung Luft*, 33(2):76-79, Feb. 1973. 22 refs.

From 1959 to 1964 a number of dust measurements were made in Dutch iron foundries; these measurements and measurements in German, Finnish, and Swedish foundries are discussed. Standard measuring methods and more knowledge of dust-producing conditions are needed. Since it is not yet known whether the particle number or weight is best used for the dose-effect correlation, the gravimetric dust concentration in mg of the ashing-resistant (700 C) dust/cu m air was determined, as well as the numeric dust concentration (the number of ashing-resistant (400 C) particles/cu m air), the numeric concentration as the number of acid-resistant particles (in 6 N hydrochloric acid)/cu m air, the gravimetric dust concentration of the ashing-resistant (700 C) particles of less than 5 micron/cu m air, the gravimetric dust concentration of quartz particles of less than 5 micron (determined by X-ray diffraction) and the gravimetric dust concentration of cristobalite asbestos particles of less than 5 micron. In the latter two cases a gravimetric dust sampler with a filter and a sampling speed of 1.20 m/sec plus or minus 10% (1000 l/min) was used. In the first case a gravimetric filtering apparatus and a sampling speed of 0.20 m/sec plus or minus 10% (50 l/min) was applied. The results agreed with the data collected by Schmidt over many years. A comparison with dust measurements taken in foundries of other countries was not feasible because of the different use of the sampling apparatuses and different evaluation methods.

27306

APTIC NO. 49761

Pohle, R.

OPERATING EXPERIENCES WITH THE INCINERATOR OF THE CITY OF NUREMBERG. (*Betriebserfahrungen mit der Müllverbrennungsanlage der Stadt Nürnberg*). Text in German. *VGB Kraftwerkstechnik*, 53(2):93-99, Feb. 1973. 2 refs.

The experiences gained with the incinerator in Nuremberg during the first three years of its operation are discussed. In order to keep corrosion at the heating surfaces and the electrostatic precipitator at a minimum, the incinerator is operated 24 hours a day 7 days a week. Incrustations on the walls of the combustion chamber occurred very soon. Water jets conducted parallel to the walls prevented any further incrustations. Ex-

tensive measurements of the flue gas composition in the combustion chamber revealed that without secondary air supply, carbon monoxide values of more than 0.5% occurred locally. The total oxygen concentration was then below 5%. With secondary air injection (about 10,000 cu m/hr), the CO peak concentrations dropped in number and magnitude. Through lateral injection of secondary air alone, the CO peak concentrations could not entirely be avoided. An additional frontal injection of secondary air would bring a marked improvement. The largest CO concentrations were measured at those points where corrosion was noticed. Minor disturbances occurred during the charging process through bulky parts and at the slag-tap-off through larger iron parts. In the electrostatic dust precipitators dust bridges formed and the screw conveyor for the dust tap-off from the electrostatic precipitators had to be replaced. The specific operating costs for 1971 amounted to 19.58 DM/t of waste.

27307

APTIC NO. 49764

Reisner, Josef-H.

THE GAS TURBINE POWER PLANT FLINGERN. PRODUCTION OF POWER FOR PEAK DEMAND WITH GAS TURBINE POWER PLANTS. (*Spitzenstromerzeugung mit Gasturbinenkraftwerken. Das Gasturbinenkraftwerk Flingern*). Text in German. *Elektrotech. Z. B.*, 25(5):100-102, 1973.

In Duesseldorf-Flingern a gas turbine power plant for covering peak power demands was built. The gas turbine plant is located on the site of the 110 kV transformer station. The turbo-group comprises six jet drives. They supply the gas for three turbines. Generator and turbines are arranged on one shaft. The plant is operated with extra-light fuel oil. Natural gas can also be used. Both fuels are nearly free of ash components so that the dust emission is at a minimum. The drives are equipped with combustion chambers in which a nearly smokeless combustion is guaranteed by a high fuel pressure, fine atomization, and optimum mixing.

27308

APTIC NO. 49147

Schwarzbauer, G.

THE COMBUSTION PROCESS AND THE FORMATION OF THE OXIDES OF NITROGEN IN THE OTTO ENGINE. (*Verbrennungsablauf und Stickoxidbildung im Ottomotor*). Text in German. *Motortech. Z. (Stuttgart)*, 34(3):77-84, 1973. 12 refs.

The influences and the fuel/air ratio, shape of the combustion chamber, compression, and ignition time on the combustion process and the formation of the oxides of nitrogen was studied by thermodynamic analysis of the pressure characteristics in the combustion chamber made visible on an oscilloscope. If lambda is increased from a low lack of air onward, the duration of the ignition delay and combustion increase. A high air surplus prolongs the terminal phase of the combustion. A high turbulence in the combustion chamber shortens the ignition delay and the duration of the combustion and increases the pressure and temperature. It favors the combustion of mixtures with high air surplus and diminishes the octane demand of the engine. The nitric oxide emission is not influenced by the turbulence at lambda less than one. At lambda higher than one the NO emission drops with increasing turbulence despite higher medium combustion chamber temperatures. The NO emission as well as the maximum average combustion chamber temperature remain uninfluenced by compression at lambda less than one, they increase with the compression at lambda higher than one. In the range of optimum advanced ignition, the highest average combustion chamber temperatures occur at lambda equals one. Here the NO emission is highest. The cyclic fluctuations of the combustion processes are not due to cyclic variations in the fuel/air ratio but to fluctuations of the ignition delay which most likely stem from changes of the turbulence. The cyclic fluctuations cause different NO concentrations in the exhaust of individual cycles which are very low at

lambda equal to 0.8 and which increases with increasing lambda. At lambda equal to 1.4, fluctuations in the ratio of 1 to 50 occur. Through diminishing these cyclic variations and through control of the combustion, the NO emission can be reduced without losses of the average pressure. A model of NO formation in the Otto engine was developed which had good agreement with the experiments.

27309

APTIC NO. 49724

Sherman, Charles J.

IS OUR INDUSTRY GOING UP IN SMOKE? Crops Soils Mag., 25(4):18-19, Jan. 1973.

The contribution of crop residue burning (open field burning) to air pollution is discussed. Reasons for continuing the practice of open burning are presented. Open field burning contributes an estimated 15% to 20% of the total annual fine particle emissions in agricultural areas. The major criticism of the smoke from open field burning is its nuisance effect, soiling damage, respiratory ailments, driving hazards, and loss of aesthetic values. Alternatives to open field burning must take into consideration the following: field sanitation, residue removal, and residue disposal. Alternatives include putting the lands to different uses, i.e., growing different crops, such as pasture, spring oats, clover, vetch, sweet corn, and beans; raising beef or sheep; soil incorporation of residues; and the use of a mobile field incinerator. The problems involved in each of these alternatives and their cost of implementation are reviewed.

27310

APTIC NO. 49111

Simecek, Jaroslav

TEN YEARS OF DUST MEASUREMENTS IN AN ORE MINE. (Zehn Jahre Staubuntersuchungen in einer Erzgrube). Text in German. Staub, Reinhaltung Luft, 33(2):79-84, Feb. 1973.

Dust concentrations were measured for 10 years in typical working areas of an ore mine. At each sampling place four sedimented dust samples and aerosol samples were obtained over a longer period. The samples were used for determination of the particle size and quartz concentration. The highest dust concentrations occurred during dry boring, during working at the face, at the mill chute, and during blasting. The influence of the number of hammer drills and of the depth of boreholes on the dust concentration formed during boring is discussed. The concentration measurements are compared with productivity. Biological tests and epidemiological studies are continuing.

27311

APTIC NO. 49551

Tsuji, Shoichi and Minoru Asai

CHARACTERISTICS OF NITROGEN OXIDE FORMATION IN BURNER FLAMES. (Bahna kaen ni okeru chissosankabutsu no seiseitokusei). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 85-88, 1973. 1 ref. (Presented at the Japan Society of Mechanical Engineers, Annual Meeting, 50th, Tokyo, April 2-4, 1973.)

Flame length, air volume, temperature distribution, nitrogen oxides, and oxygen in a test combustion chamber were studied. The NO_x formation increased in proportion to the fuel quantity, and gave a maximum value when the air ratio was 20-30% excess. Temperature distribution was generally higher in a short flame than in a long one. At 980 mm from the jet nozzles emitting air and fuel, 1560 C and 98 ppm NO_x occurred with a short flame and 1240 C and 37 ppm NO_x with a long flame. Thus, NO_x formation depends on temperature. Partial O₂ pressure also affected NO_x formation; on the flame axis, O₂ and NO_x concentrations were low in spite of high temperature; at its circumference, their level was high although the temperature was lower. Carbon monoxide and carbon dioxide were also measured.

AIR POLLUTION ABSTRACTS, JUNE 1973

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APTIC NO. 49493

Usemann, Klaus W.

THE CONTINUOUS DEVELOPMENT OF THE HEATING AND SANITARY AREAS. (Die Sanitaer- und Heizungsbranche profitiert sich immer staerker). Text in German. R.A.S./Rohr-Armatur-Sanitar-Heizungstech., 28(2):57-60, Feb. 1973.

Recent trends and achievements in the sanitary (plumbing) and domestic heating areas are outlined with regard to environmental concerns. The contribution by domestic heating and small-scale industry to sulfur dioxide and carbon monoxide emissions, estimated now at about 3,400,000 and 4,500,000 tons annually, is 10%. With the percentage of solid fuel in the fuel volume used for domestic heating purposes being relatively high, low-sulfur liquid fuel and gaseous fuels are being increasingly used. Gas-fired central heating with water cycle is increasingly popular. The use of electricity and remote heating constitutes no genuine solution to the air pollution problems, but implies a relocation of emission sources, instead.

27313

APTIC NO. 49423

Wiesenberger, J.

STUDIES OF THE COMBUSTION OF A SLUDGE BURNER. (Feuerungsuntersuchungen mit einem Schlammverbrenner). Text in German. Wasser Luft Betrieb, 17(1):24-26, 1973. 2 refs.

A burner is described which burns liquid waste material such as waste oil, and solvents without soot and carbon monoxide. The main part of the burner is the nozzle which has two channels concentric to each other. In the centric channel the combustion medium is passed to the combustion chamber while the annular channel serves for the supply of compressed air or steam. The latter is passed to a resonance chamber where intense sound vibrations are produced through which the fuel is atomized. At the end of the combustion chamber, shortly before the stack connection, nozzles are arranged which blow cold air into the hot flue gases to cool them to about 800 to 1000 C. The waste gases are discharged via a 10 m stack. Combustion tests were performed with two different combustible liquids, waste oil and lacquer solvent. A sludge burner of the type GS 100 with a maximum throughput of 100 kg/hr liquid fuel was used. The maximum allowable concentration for CO and for soot as demanded by DIN 4787 was not exceeded in any instance.

27314

APTIC NO. 49245

Yamaguchi, Tadaaki

ON THE TREATMENT METHOD OF RESIDS FROM VACUUM DISTILLATION OF HEAVY OIL. (Jushitsuyu no genatsu zanya no shoriho). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 25(2):26-31, Feb. 1973.

The resids from vacuum distillation of heavy oil from the Middle East contain as high as 80-500 ppm of vanadium and nickel, and 5-12% of asphaltene. The resids can be treated by the solvent extraction method by using propane or butane or a mixture of the two at proper portions. The shortcoming of this method is the high cost. The most effective method for the treatment is to convert the resids into light oil such as gasoline and kerosene by decomposition followed by hydrodesulfurization and purification. The decomposition method usually generates hydrocarbon gases and cokes. Therefore, one of the key points of this method is the treatment and utilization of the by-products. Four different decomposition methods are described.

27315

APTIC NO. 49273

Yanagihara, Shigeru

AIR POLLUTION AND EMISSION CONTROL VERSUS SOCIAL ENVIRONMENT. (Haiki gasu mondai o meguru shakai kankyo). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 27(1):40-42, Jan. 1973. 1 ref.

The exact pollutants from the emission of automobiles are not known completely, although it is desirable to decrease emission of carbon monoxide, nitrogen oxides, and hydrocarbons. It is doubtful if a catalyst device is the only answer. Can the drivers be trusted to maintain the device at its workable condition? Road traffic is still on the increase due to the cost-benefit consideration. Therefore, even if there are low-pollution cars in 1976, pollution by cars cannot disappear completely. There are particulates, including mist, odor, and aldehydes still to be considered. The objections to noise and the space cars occupy will increase. In Japan, attention will be focused on HC emitted by two-cycle gasoline engines, as well as on other matters, which are ignored at the moment. Environmental problems will not be solved within 5 years. Even if all the cars are stopped now, the problem of photochemical smog will still exist. The sort of technology which would truly solve the environmental problems must be developed.

1972

27316

APTIC NO. 49205

Japan Environmental Agency

DATA ON NITROGEN OXIDES. (*Chisso sankabutsu kan-kei shiryō*). Text in Japanese. 110p., Aug. 1972.

The nationwide total emission of nitrogen oxide in 1968 was 20.6 million tons, of which more than 10 million tons resulted from transportation engine exhaust. The total emission has increased by 3.9 million tons from 1965 to 1968. Measurement of NOx concentration in flue gas from a boiler of heating facility by the Saltzman method revealed that the concentration was as high as 124 ppm when heavy oil was burned at a rate of 1300 to 1600 l/hr. The NOx emission could be controlled by improving the combustion techniques such as applications of low-excess air combustion, two-stage combustion, flue gas recycling, flue gas recycling-two stage combustion, and off-stoichiometric combustion.

27317

APTIC NO. 49320

Japan Public Health Assoc.

STUDIES ON THE POLLUTANTS CONTAINED IN AUTOMOBILE EXHAUST GAS. (*Jidosha haishutsu gasu ni fukumareru busshitsu ni kansuru kenkyū*). Text in Japanese. 61p., March 1972.

Exhaust gases from two typical domestic automobiles using two different sample gasolines were analyzed for the carbon monoxide, hydrocarbon, and nitrogen oxide concentrations. The experiments were carried out using a chassis dynamometer at four and seven-cycle modes. The CO, HC, and NOx in the exhaust gases were determined by a constant volume sampling method which measured the weights of the three components and the compositions of the hydrocarbons; the total aldehydes were determined by gas chromatography and colorimetric methods. The CO concentration was higher at four-mode, whereas the differences of HC and NOx concentrations between the two modes were not significant. The CO and HC concentrations were higher at hot-start than at cold-start, especially with the four-mode. No difference of the trend was found between the two different gasolines. The compositions of the hydrocarbons in exhaust gas depended on the composition of the gasoline.

27318

APTIC NO. 49337

Airesearch Mfg. Co. of Arizona, Engineering Staff

AUTOMOBILE GAS TURBINE OPTIMIZATION STUDY. (FINAL REPORT). Office of Air Programs Contract 68-04-0012, Rept. AT-6100-R7, APTD-1291, 420p., July 14, 1972. 14 refs.

NTIS: PB 213389

Data on automobile engines with single-shaft, free-turbine, and multiple-spool configurations were analyzed in a series of design-point cycle studies to determine optimization criteria

with respect to emissions, performance, cost, and operational life for an automobile gas turbine. Cycle pressure ratios and temperatures, with turbine cooling flow rates, were varied, and the effects of cycle modifiers were examined. The performance curves were used in a computer vehicle simulation program to compute vehicle acceleration performance, fuel economy for selected driving schedules, and emission estimates for carbon monoxide, hydrocarbons, and nitrogen oxides. A relatively low pressure ratio, single-shaft engine with regeneration was the system most capable of meeting or exceeding the optimization criteria. To minimize fuel consumption and cost, a high heat recovery effectiveness (85-90%) was specified. The optimum design for the heat recovery device was studied. All of the engines studied met the CO and hydrocarbon standards with a margin, but none of the conventional combustors met the NOx requirement. The recuperated engine had the lowest NOx emissions. (Author summary modified)

27319

APTIC NO. 49452

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

ODORS AND AIR POLLUTION: A BIBLIOGRAPHY WITH ABSTRACTS. Pub. AP-113, 261p., Oct. 1972. 1021 refs.

NTIS: PB 213733

A bibliography of 1021 references and abstracts is presented on odors and air pollution with respect to emission sources, control methods, measurement methods, air quality measurements, atmospheric interactions, basic sciences and technologies, effects on human health, plants, livestock, and materials, economic aspects, standards and criteria, legal and administrative aspects, and social and general parameters.

27320

APTIC NO. 49727

Processes Research, Inc., Cincinnati, Ohio, Industrial Planning and Research

AIR POLLUTION FROM NITRATION PROCESSES. Office of Air Programs Contract CPA 70-1, Task 22, 82p., March 31, 1972. 25 refs.

NTIS: PB 217106

Air pollution from nitration processes was investigated. Those compounds which had a production of over 1 million lb utilizing nitric acid or its oxides were selected as important nitration compounds to be studied. These compounds, their formulas, their 1970 production, and the amount of nitric acid utilized in their production are listed. Fifteen processes employed for the production of the 14 most important nitro products were surveyed, including: nitration of ammonia, nitric acid oxidation of cyclohexanol, nitric acid oxidation of p-xylene, nitric oxide oxidation of propylene, nitration of benzene, toluene, and chlorobenzene, nitric acid oxidation of glucose, nitration of paraffins, nitric acid oxidation of potassium chloride, nitric oxide oxidation of sodium carbonate, and nitration of glycerine and cellulose. Air pollutants from these processes were identified, the present and future quantities of pollutants were estimated, and the applicability of control devices presently used in nitric acid production for controlling the air pollutants from the nitration processes was evaluated. Research and development objectives for the monitoring and control of these air pollutants were recommended.

27321

APTIC NO. 49728

Processes Research, Inc., Cincinnati, Ohio, Industrial Planning and Research

AIR POLLUTION FROM CHLORINATION PROCESSES. Office of Air Programs Contract CPA 70-1, Task 23, APTD-1110, 68p., March 31, 1972. 24 refs.

NTIS: PB 218048

Air pollution from chlorination processes was investigated. Because of the apparent potential for atmospheric pollution with chlorine, hydrochloric acid, and various hydrocarbon compounds, a survey of the processes used for the production of the 16 most important chlorinated hydrocarbon products was undertaken. Past, present, and projected production figures for these materials are given. Production processes were classified into five groups: liquid phase chlorinations at less than 100 deg C and at near atmospheric pressure, hydrochlorinations at less than 200 deg C and 40 psig, vapor phase chlorinations at over 500 deg C and at 2 to 15 psig pressure, vapor phase dehydrochlorinations at over 600 deg C and at less than 60 psig, and vapor phase oxychlorination at 300 deg C and 75 psig. Industries, products, processes, and sources of pollution within the processes are discussed. It was recommended that present and future studies of control devices should consider the possible applicability of development work to produce increased efficiency and lower costs for control of pollution.

27322

APTIC NO. 49794

Bureau of Mines

IMPORT SUPPLEMENT TO OIL AVAILABILITY BY SULFUR LEVELS. Office of Air Programs Rept. APTD-1293, 45p., June 1972.

NTIS: PB 211072

Lists of the quantities of imported oil, imports by sulfur content, country of origin (source of oil), port of entry, and the quantity of elemental sulfur in the fuel oil are presented. Legislative actions regulating the sulfur content of imported heavy fuel oils were responsible for increases in low-sulfur imports. Between 1968 and 1971 imports of residual and no. 4 fuel oils totaled 1.92 million barrels, of which 653 million barrels (34%) was classified as low-sulfur. An estimated 5.2 million tons of elemental sulfur was contained in these imports. Venezuela was the principle source (38%), and the Port of New York received the greatest volume of imports. Evident trends in 1971 indicate that the demand for low-sulfur residual and no. 4 fuel oils exceeds the supply. Requirements to meet the anticipated demand for energy will include new desulfurization plants, low-sulfur crude oil substitutions for residual fuel oil, blending of heavy fuel oils, and use of low-sulfur coal (as fuel or source of synthetics). (Author abstract modified)

27323

APTIC NO. 49821

Walden Research Corp., Cambridge, Mass.

BACKGROUND INFORMATION FOR ESTABLISHMENT OF NATIONAL STANDARDS OF PERFORMANCE FOR NEW SOURCES. CASTOR BEAN PROCESSING. Office of Air Programs Contract CPA 70-165, Task Order 7, APTD-1361, 34p., July 1972. 24 refs.

NTIS: PB 213294

Castor bean processing and the use of castor oil in industry are discussed. General characteristics of castor oil, its toxicity, and production are reviewed. Production methods and processes, including hydraulic pressing, screw pressing, and solvent extraction for seed handling; castor pomace processing, and castor oil refining to derive dehydrated oil, sulfated oil, hydrogenated oil, and blown castor oil are described. Uses of castor products (oil and castor pomace), the industrial emissions from the oil refining, and particulate emissions from handling are reviewed. The use of dry particulate collectors and wet scrubbers for dust collection, the adsorption of odors, and incineration of organic gases by catalytic oxidation, thermal, flame or fume incineration are discussed. Economic and statistical information is given for oil production facilities.

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APTIC NO. 49825

TRW Systems Group, Redondo Beach, Calif.

DEVELOPING HIGH CHARGE AND DISCHARGE RATE LEAD/ACID BATTERY TECHNOLOGY. (FINAL REPORT). Office of Air Programs Contract 68-04-0028, TRW Doc. 18353-6006-RO-00, 170p., April 1972.

NTIS: PB 213257

The development of a high charge rate, high discharge rate lead-acid battery compatible with the requirements of a hybrid heat-engine/electric vehicle is discussed. A development program was undertaken to optimize the lead-acid battery for hybrid-vehicle use -- to maximize specific power without significantly affecting cost, lifetime, or maintenance, or changing the manufacturing process. Ten test cells producing specific powers of 150 W/lb for a 75-sec discharge and 204 W/lb for a 20-sec discharge were developed and tested. An analysis of state-of-the-art batteries showed that significantly higher specific power could be achieved by modifying cell components. To obtain quantitative data permitting a closer approach to an optimum design, component parameters were tested in statistically designed experiments designed to indicate optimum plate thickness, paste density, grid design, and material. Bipolar and tubular plate batteries, their characteristics, and the advanced technology needed before they could be put in use, were considered.

27325

APTIC NO. 49912

National Industrial Pollution Control Council, Washington, D. C., General Manufacturing Sub-Council

THE TOBACCO INDUSTRY AND POLLUTION. SUB-COUNCIL REPORT. 14p., Feb. 1972.

GPO

The environmental problems in the tobacco products manufacturing industry and the abatement programs in progress are reviewed. The most critical problem in the industry is air pollution, originating with in-plant dust, tobacco volatiles and particles, and emissions to the atmosphere generated by the manufacturing processes and steam plants. Controls to be implemented include filters, dust collectors, scrubbers, the use of low-sulfur fuels, and process modifications. Odor control or reduction at the point of origin is also under investigation. Liquid and solid waste disposal problems are considered.

27326

APTIC NO. 49957

Thermo Electron Corp., Waltham, Mass., Research and Development Center

DETAILED DESIGN: RANKINE-CYCLE POWER SYSTEM WITH ORGANIC-BASED WORKING FLUID AND RECIPROCATING EXPANDER FOR AUTOMOBILE PROPULSION. VOLUME I. TECHNICAL REPORT. Environmental Protection Agency Contract EHS 70-102, APTD-1154, Rept. 4134-71-72, 271p., May 5, 1972.

NTIS: PB 210836

The development of a low-emission Rankine-cycle propulsion system for automobiles is discussed. The system is based on use of an organic-based working fluid with reciprocating expander. The mixture used is 85 mole% trifluorinol and 15 mole percent water. The detailed, optimized design of the system including packaging of the complete system in the reference car, a 1972 Ford Galaxie is described. The results of experimental development in several critical areas are presented. The system is designed to provide performance approximately equivalent to use of a 351 cubic inch displacement internal combustion engine in the reference car. Performance calculations indicated that a system designed to provide 131 hp net shaft horsepower (feedpump and condenser fan power subtracted) at an expander speed of 1800 rpm provides acceptable performance for the 1972 Galaxie. Emission measurements were made with a burner designed for a 100 shp Rankine-cycle system; these confirmed the low emission potential of the

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Rankine-cycle system. The customer-average fuel consumption with the 1972 Ford Galaxie was predicted to be 10 pg. Only low-cost materials were used in the system. The system design is adaptable to high volume production techniques. (Author abstract modified)

27327

APTIC NO. 49800

Ashby, H. Anthony

INTERIM REPORT ON TESTING OF A MERCEDES BENZ DIESEL SEDAN. Office of Air Programs; Test and Evaluation Branch, Rept. 72-18, APTD-1402, 5p., March 1972.

The exhaust emission characteristics of a diesel engine powered passenger car were studied to determine the effect of the engine modifications on emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. Emissions of CO were well within the required level for 1975; mass emissions of hydrocarbons were very close to the 1975 levels; and emissions of NOx were about four times the level required for 1976.

27328

APTIC NO. 49494

Beedgen, Otto

DESIGN AND OPERATION OF INDUSTRIAL GAS BURNERS. (Einsatz und Aufbau von Gasbrennern fuer die Industrie). Text in German. Gas Waerme Int., 21(12):557-565, Dec. 1972. 6 refs.

Uses and designs of industrial gas burners are reviewed. Gas burners are used for industrial furnaces, incinerators, and hot gas generators (e.g., brewer's coppers, malt kilns, coffee roasting plants, and other drying facilities). Three different categories of partially premixing, premixing, and jet type industrial gas burners are distinguished. High rate of ignition, stable flame, and flexibility of the fuel-to-air ratio within the ignition limits from air deficit to air excess, are required. Changes in the kind of the gaseous fuel should require no or little modification of gas burners. The energy requirements of the industry will be increasingly satisfied by gaseous fuels due to their advantageous combustion behavior, cleanliness, flexibility, and economy. The wide-spread occurrence of natural gas will be an added impetus to this trend.

27329

APTIC NO. 49444

Benhart, John Edward

SUBURBANIZATION OF MANUFACTURING: A CASE STUDY OF THE PITTSBURGH STANDARD METROPOLITAN STATISTICAL AREA. Tennessee Univ., Knoxville, Dept. of Geography, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1972. 172p. 198 refs.

Intrametropolitan movement of manufacturing in the Pittsburgh Standard Metropolitan Statistical Area was analyzed. Intrametropolitan movement occurred from all the manufacturing nodes, but the central city of Pittsburgh was the greatest net loser through manufacturing relocation. Food and kindred product establishments, and manufacturing types such as job printing, instruments and related products, and textiles and apparel are located near the center of the city because of external economies derived from immediate accessibility to the purchaser prior to the actual process of manufacturing. In the late 1800s iron and steel plants began to move away from the central city, and served as the focuses for manufacturing clusters. A certain degree of locational regularity is present among particular manufacturing types. A knowledge of manufacturing evolution can help future metropolitan planning in land use development, service needs, transportation facilities, and control of air and water pollution.

27330

APTIC NO. 49766

Berliner, Paul

DRY AND WET COOLING: A COMPARISON. (Trockene und nasse Rueckkuehlung: ein Vergleich). Text in German. Brennstoff- Waerme-Kraft, 25(2):43-48, 1973. 20 refs. (Presented at the American Nuclear Society, Winter Meeting, 1972.)

Important features of dry and wet cooling towers are compared. Dry cooling produces no vapor plumes which produce fog and ice in the vicinity. Dry cooling is preferably used when replenishing water is available in sufficient quantity, when the power costs are low, when the exchange process takes place within a building, when the final temperature of the medium to be cooled may be rather high in summer, and when no vapor plumes can be tolerated due to climatic conditions. In order to compare the power consumption of the two processes a dimensionless number E was derived from the Chilton Colburn analogy. This number E depends primarily on the air condition at the cooling site and can be illustrated in a diagram. Optimum operating conditions can be achieved with a cooling tower which can be adapted to the changing weather conditions. In winter dry cooling is used. In summer evaporation cooling is necessary because of the high temperature of the ambient air. For automatic switching between the two cooling systems a fog visiometer can be used.

27331

APTIC NO. 49954

Boeer, K. W.

DIRECT SOLAR ENERGY CONVERSION FOR TERRESTRIAL USE. In: National Science Foundation Authorization Act of 1973. 92nd Congress (Senate), (Hearing before the Special Subcommittee on the National Science Foundation of the Committee on Labor and Public Welfare), p. 308-317, May 2, 1972. 8 refs.

GPO

The deployment of cadmium sulfide/copper sulfide (CdS/Cu₂S) solar cells on terrestrial surfaces for large-scale direct solar energy conversion is proposed. Several possible systems are suggested for conversion of the solar energy into useful, stabilized electric power, including rotating invertors, multiphase invertors, and pulse modulation. The tandem operation of the conversion systems and conventional electric supply from power utilities would add to the reliability of the supply, since the time of peak demand coincides mostly with the time of high solar input. Estimated total costs of solar conversion systems manufactured by mass production techniques are \$200-500/kw. Estimated consumer rates (1.2-4.2 cents/kwh) are comparable with current rates for electric energy. In a combined solar electric and heating system, thermal energy for private homes should cost approximately \$1/million Btu and electric energy 3 cents/kwh. The overall conversion efficiency of CdS/Cu₂S cells may approach 7% by 1975; hence 1 kw installed may produce 1800 kwh/yr of operation. Improved cells will have a lifetime approaching 20 yr.

27332

APTIC NO. 49134

Bova, Ben

PHYSICISTS PROBE THE ULTIMATE SOURCE OF ENERGY. Smithsonian, 3(9):38-45, Dec. 1972.

Plasma technology is one possible means of solving the energy crisis. A plasma is an ionized gas; it is a mixture of ordinary neutral atoms, ions, and free electrons. A plasma can easily conduct electricity and can be manipulated by electromagnetic forces to produce electrical power. Magnetohydrodynamics (MHD), the interaction of a moving plasma with a magnetic field, can directly convert heat energy into electricity. The two advantages of MHD are high efficiency and low pollution. While modern turbo-generator plants are 40% efficient and nuclear plants are less, MHD plants are 50-60% efficient. Excess heat in the MHD plants is used to make steam for conventional steam turbines or used directly on gas turbines. The

MHD process produces such high quantities of certain pollutants that it becomes economical to separate them by conventional methods for reuse. To date, MHD generators are still experimental machines. Thermonuclear fusion is another method for obtaining energy by forcing isotopes of hydrogen together. For example, deuterium can be taken from seawater and fused to produce energy; in 1 cu m seawater there is enough deuterium to yield more than 400,000 kw-hr of energy. However, the requirements of a 46 million degree K reaction temperature, a plasma density of 10 to the 15th power ions/cu cm, and keeping the plasma at this temperature and density for 1/10th of a second have not been solved.

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APTIC NO. 49565

Braun, R.

AIR POLLUTION CONTROL TECHNIQUES IN SOLID WASTE REMOVAL. (*Luftreinhaltung im Zusammenhang mit der Beseitigung fester Abfalle*). Text in German. *Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA*, Basel, Switzerland, 1971, p. 243-256, 1972. 6 refs.

Solid waste disposal methods including dumping, composting, and incineration can all cause air pollution. Uncontrolled dumping sites can cause offensive smells, dust, and gas emissions. Controlled dumping is the least-polluting waste disposal method. Odors are especially frequent in large composting plants, particularly if the material is insufficiently aerated during putrefaction. Modifications in composting practices can sometimes reduce such emissions. Formerly, incineration plants were not equipped with satisfactory gas purification systems used to reduce dust and flue gas. Modern control systems using electrostatic precipitators in combination with cyclones reduce the amounts of dust emissions (150 mg/N cu m with 7% carbon dioxide). Tolerable limits are sometimes exceeded by small incineration plants, particularly those operated intermittently, because they are not equipped with precipitators. Incineration of plastics such as polyvinyl chloride causes emissions of hydrochloric acid. Concentrations of 120-700 ppm HCl in combustion gases may still be considered harmless as well as sulfur dioxide, nitric oxide, and nitrogen dioxide emissions. However, the growing use of plastics may increase such emissions, so monitoring and control plans for incinerators are being developed. Monitoring of stack emissions with consideration of orographic conditions, topographic situations, and obstacles will be useful in making more accurate forecasts of ground-level pollution.

27334

APTIC NO. 49447

Cairns, E. J., E. C. Gay, R. K. Steunenberg, H. Shimotake, J. R. Selman, T. L. Wilson, and D. S. Webster

DEVELOPMENT OF HIGH-SPECIFIC-ENERGY BATTERIES FOR ELECTRIC VEHICLES. *Argonne National Lab., Ill., Chemical Engineering Div., Rept. ANL-7953*, 120p., Sept. 1972. 39 refs.

NTIS: ANL-7953

Small-scale cells of the types Li/LiX/S and Li/LiX/(S + additive), where LiX represents a low-melting salt mixture containing lithium halides, were studied to determine the feasibility of their use as low-cost, high-specific-energy and high-specific-power batteries for electric automobile propulsion. The cells were tested at 385 C for operation at a specific energy of 220 Whr/kg and a specific power of 220 W/kg. Complete data on the experimental procedures, operating variables, testing, cost analyses, and study results are examined. Lithium/sulfur cells using a molten lithium halide-containing electrolyte and operating at 360-390 C achieved capacity densities of up to 0.9 Ah/sq cm at a current density of 0.9 A/sq cm with a cycle life of more than 2000 cycles during 7000 hr of operation. (Author abstract modified)

27335

APTIC NO. 49977

Dottrepe-Grisard, N.

INCINERATION OF PLASTIC WASTES AND AIR POLLUTION. (*Incineration des plastiques et pollution atmospherique*). Text in French. *Tribune CEBEDEAU (Centre Belge Etude Doc Eaux)*, 25(348):467-475, Nov. 1972. 26 refs.

General problems of waste incineration-generated air pollution, and the specific problems involved in the incineration of plastic wastes are reviewed. Plastic wastes, now accounting for some 2% of the total domestic refuse in Belgium, are composed of 1.75% polyethylene, 0.3% polystyrene and 0.2% polyvinyl chloride which gives rise to hydrochloric acid on incineration. Wood, paper, and vegetables also produce HCl when incinerated. The HCl emission from waste incinerators is far less than the theoretical value, since 30-40% of the HCl formed is bound by buildups and fly ash. The formation of HCl may be due to high temperature reactions of inorganic chlorides with iron and aluminum silicates, where the iron and aluminum chlorides formed hydrolyze to hydroxides and HCl, or to reactions of alkaline chlorides with acid sulfates in the presence of humidity. Hydrochloric acid causes corrosion of metal surfaces in incinerators. The HCl content in incinerator waste gases can be effectively reduced by 70-80% by the addition of pulverized calcium hydroxide, or by scrubbing with water or an alkaline solution.

27336

APTIC NO. 49462

Dugger, G. L., A. Brandt, J. F. George, I. L. Perini, D. W. Rabenhorst, T. R. Small, and R. O. Weiss

HEAT-ENGINE/MECHANICAL-ENERGY-STORAGE HYBRID PROPULSION SYSTEMS FOR VEHICLES. (FINAL REPORT). *Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab., Office of Air Programs Contract N000-17-62-C-0604, APTD-1344, CPO11, 319p., March 1972. 163 refs.*

NTIS: PB 213417

Experimental and analytical studies were conducted on high-specific energy flywheel systems for use in automotive propulsion systems. Proof-of-principle tests of the superflywheel concept demonstrated the use of filamentary or composite materials of high uniaxial tensile strength in rotor configurations that have higher specific energies than prior flywheels. The performance of such flywheels was evaluated, alone and in combination with heat engines in family cars, commuter cars, vans, and intracity buses. The analytical study indicated that a flywheel-only propulsion system could satisfy the performance requirements specified by the Office of Air Programs for a city bus, and that flywheel/heat engine hybrids could meet the specified requirements for cars, vans, and buses. Substantial emission-free ranges were achieved with hybrid systems by using the engine only periodically (at constant load) to recharge a large, high-energy flywheel. The experiments verified the principle of the superflywheel by spin tests of unidirectional materials in rod or bar rotor configurations. All experimental and analytical studies are described and discussed. Experimental equipment and results are given.

27337

APTIC NO. 49563

Eberan-Eberhorst, R.

AIR POLLUTION BY AUTOMOBILE EXHAUST GASES AND ITS CONTROL. (*Die Luftverunreinigung durch Automobilabgase und ihre kuenftige Beseitigung*). Text in German. *Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA*, Basel, Switzerland, 1971, p. 199-229, 1972. 7 refs.

Sources of dust, sulfur oxides, nitrogen oxides, carbon monoxide, and hydrocarbons are mentioned. Automobiles produce carbon monoxide, the most toxic of all exhaust gases. Nitrogen oxides and unburned hydrocarbons which are also emitted by cars, are important in photochemical smog produc-

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tion. Fuel fumes and exhaust gases also cause odors. The relative harmfulness of pollutants can be determined by calculating the ratio between the concentrations measured and their maximum allowable concentration values. International standards should be set up for pure air. The U. S. regulations for automobile exhaust gas are very strict, and increase in strictness each year. However, most European cars still fall short of meeting the American exhaust standards because of the proportion and composition of the air/fuel mixture, especially when the car is in motion. Exhaust gas components such as CO and HC can be reduced inside the cylinder by engine operation modifications, even without afterburning. Nitrogen oxides reduction, to the extent foreseen for 1975 in the U. S., can probably only be obtained with catalytic afterburners. It is still doubtful whether NOx reduction will become obligatory in Europe.

27338

APTIC NO. 49133

Elles, H. C.

NATURAL GAS AND TOTAL ENERGY. *Chem. Engr. (London)*, no. 267: 431-433, Nov. 1972. (Presented at the Institution of Chemical Engineers, Meeting of the North Western Branch, April, 1972.)

A description is given of the use of natural gas in total energy systems implying on-site electrical power generation by a single energy source fuel, with the recovery of wastes incidental in other appropriate forms, such as high pressure or low pressure steam, hot water, or hot clean gases. Waste heat recovery is possible for such purposes as process heating, space heating, air conditioning, or refrigeration. Gas turbines, dual-fuel engines suitable for natural gas-light-oil firing, and spark ignition engines are among the available prime movers suitable for natural gas-oriented total energy systems. Commercially available spark ignition engines with stroke volumes ranging from 1460 to 19,600 cu cm have been successfully operated on natural gas. Natural gas can also be used to operate industrial vehicles, such as fork trucks, handling trucks, with the advantage of reduced pollution and wear.

27339

APTIC NO. 49757

Fatzner, R.

TETRAETHYL LEAD A TOXIN IN THE ENVIRONMENT. (*Bleitetraethyl als Umweltgift*). Text in German. Preprint, 7p., 1972. (Presented at the International Convention on Civilization Diseases, Nutrition, Environment, and Living Conditions, 18th, Berlin, West Germany, Sept. 16-23, 1972.)

Tetraethyl lead was developed more than 45 years ago at the Kettering Institute in Cincinnati, Ohio as an anti-knocking agent for automobile engines. Its toxicity has been belittled or denied for fear that its use would be prohibited and that engine performance would suffer. In the meantime, however, examinations have revealed that the lead concentration in the dust of busy streets has risen to 1 kg/cu m. Of the lead added to the gasoline, 75% is emitted again. Tetraethyl lead also evaporates with the gasoline. Chevrolet and Ford have shown that automobile engines can be well operated with lead-free gasolines. The switch to lead-free gasolines does not involve great costs, in fact the opposite is true. Because of any absence of lead precipitation less cleaning of the engines is required. Tetraethyl lead is at least 10 times more toxic than inorganic lead. This is not at all taken into account by the present tolerance levels. In view of the fact that tetraethyl lead is so highly toxic, regulations should be passed to curb addition of any lead to gasolines. Until the oil industry is capable of producing a high-octane fuel without lead, the engines have to be adjusted to the low-octane fuels by ignition delay and by thicker cylinder head gaskets.

27340

APTIC NO. 49842

Gelb, G. H., B. Berman, and E. Koutsoukos

COST AND EMISSION STUDIES OF A HEAT ENGINE/BATTERY HYBRID FAMILY CAR. TRW Systems Group, Redondo Beach, Calif., Office of Air Programs Contract 68-04-0058, Rept. 21054-6001-RO-00, APTD-1355, 264 p., April 1972. 4 refs.

NTIS: PB 213280

Heat engine-battery hybrid automotive power systems were studied experimentally. Detailed models of candidate heat engine-battery hybrid power trains for full size family cars were developed. Efficiency of the candidates was analyzed; and the size, first cost, and cost of ownership of such vehicles were estimated. The characteristics and suitability of three component catalytic devices and hydrocarbons traps for controlling internal combustion engine emissions within the context of a hybrid environment were investigated. Full scale emission tests of the hybrid system were undertaken. Computer modeling and simulations are also discussed.

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APTIC NO. 49241

Gildenskiold, R. S., B. V. Rikhter, and V. P. Levkin

POSSIBLE PROGNOSIS OF ATMOSPHERIC POLLUTIONS AND UP-TO-DATE HYGIENIC PRECONDITIONS FOR ESTIMATING THE EXTENT OF SPREAD OF DISCHARGES FROM HYDROELECTRIC POWER STATIONS. (*Realnost prognoza zagryazneniya atmosfery nogo vozdukh i sovremennyye gigiyenicheskiye predposylki k raschetu rasseyivaniya vybrosov GRES*). Text in Russian. *Gigiena i Sanit.*, no. 11:14-18, 1972. 9 refs.

The possibility of designing thermal power plants for sulfur dioxide levels not exceeding a maximum allowable concentration is demonstrated by an example. A power plant, designed for mazout with a sulfur content of 2.3-4%, was completed with a 180 m and a 250 m stack. Field measurements of the sulfur dioxide concentrations gave an average of 0.534 mg/cu m with a safety margin of 25%, which is in fairly good agreement with the maximum allowable concentration of 0.5 mg/cu m for which the power plant was originally designed. The respective shares of the 180 and 250 m-stacks in the above concentration level were 0.388 and 0.146 mg/cu m. The nitrogen oxide concentrations, having a ratio of 1:10 to 1:7 to the SO2 concentrations, had a statistically secured maximum of 0.075 mg/cu m at 2 km from the stacks. Another maximum obtained from the most frequent concentration values was 0.053 mg/cu m. However, the combined SO2 plus NOx concentration exceeded the value established in view to the summation effect of these pollutants.

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APTIC NO. 49375

Gomez, Manuel, Donald J. Donaven, and Kathleen Hazen

THE STATISTICAL AND SPATIAL EVALUATION OF SULFUR AND ASH IN COAL SEAMS. Bureau of Mines, Denver, Colo., Div. of Mine Systems Engineering, RI 7679, 50p., 1972. 17 refs.

The mean and standard deviation were used to describe general and specific sulfur and ash populations from one coal seam. Both deviations were incorporated in the exploration process to determine the number of drill cores necessary for seam evaluation and to guide the sequential drilling plan. Probability regions were computed to establish a basis for predicting probable ranges of average sulfur and ash concentrations. A computerized plot program was used to interpolate sulfur and ash concentrations between grid points. (Author abstract modified)

Grjotheim, K., H. Kvande, K. Motzfeldt, and B. J. Welch

THE FORMATION AND COMPOSITION OF THE FLUORIDE EMISSIONS FROM ALUMINUM CELLS. Preprint, Norwegian Society of Professional Engineers, Oslo, 44p., 1972. 42 refs. (Paper presented at the International Symposium on the Fluoride Problem in the Aluminum Industry, Trondheim, Norway, May 24-26, 1972.)

Data available on the fluoride consumption per ton of aluminum produced, the amount of fluorides retrieved from the anode gas, possible causes of the fluoride emissions, and possible reactions between the moisture content of the feed and the molten fluorides are surveyed. Quantitative calculation is presented for the emissions generated by vaporization from the melt, based on data for vapor pressures of sodium fluoride aluminum fluoride melts. While vaporization is a significant source of fluoride emissions, other and equally important mechanisms must also contribute to the emission rates. The water introduced with the feed may in part lead to hydrolysis reactions in the fluoride melt, while it may also in part be reduced to hydrogen. Another source of hydrogen is the materials of the anode. Part of the hydrogen may be anodically oxidized to hydrogen fluoride which gives a significant contribution to the total fluoride emission rate. The reactions of water vapor with the fluoride containing vapor from the melt, on the other hand, will alter the chemical composition of the emissions but will not contribute to the emission rate. The observed fluoride emission rates may be ascribed to three principal mechanisms, i.e., vaporization from the molten electrolyte, primary generation of hydrogen fluoride in the cell, and the entrainment of liquid droplets and solid dust. The available evidence indicates that these three mechanisms are of about equal significance.

Gruden, Dusan

EXHAUST EMISSION AND EXHAUST ODOR FROM FOUR-STROKE SPARK IGNITION ENGINES. (Abgasemission und Abgasgeruch des Viertakt-Fahrzeug-Otomotors). Text in German. Automobiltech. Z. (Stuttgart), 74(5):180-188, May 1972. 12 refs.

The influence of design and operation parameters on the exhaust composition in four-stroke spark ignition engines was studied. A proper choice of such parameters permits exhaust emissions to be kept within allowable limits. Modification of the shape of the combustion chamber, particularly the adoption of ellipsoid shape, the generation of turbulence, and the optimization of the spark plug position constitute effective means of abating harmful exhaust components. No relationship between combustion chamber surface-to-volume ratio and hydrocarbon emission could be determined due to the intense turbulence of the fuel mixture. While uniform fuel distribution represents a general possibility to abate exhaust emissions, and while it is possible, through proper choice of air-excess coefficient, of ignition timing, and of fuel supply, to optimize engine operation under partial load conditions either for fuel consumption or for any of the exhaust components, the combined abatement of all exhaust components involved is only possible by a combined optimization allowing for certain compromises. The degree of exhaust-generated odor nuisances is dependent on operation conditions, stroke volume, mixing ratio, engine speed and exhaust odor intensity. Abatement of both the exhaust emission and of the odor intensity at conventional spark ignition engines entails increased fuel consumption.

Gutschick, Kenneth A.

COMMERCIAL PRODUCTION OF LIME-TREATED STONE AND NEW STABILIZATION EQUIPMENT ILLUSTRATED. Preprint, National Lime Association, Washington, D. C., 3p., 1972. (Presented at the National

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Lime Association, Annual Convention, 70th, Hot Springs, Va., May 3, 1972.)

In the San Francisco area, several quarries produce poor quality stone due to the presence of clay in the deposit. Rather than wash the stone or screen out the objectionable fines, quarry operators are treating the material with 1/2-1% lime, thereby upgrading it to Class I base material. Lime is also being mixed with subgrade clay in road construction projects. The Lime stabilization, mixing, and spreading equipment used in four projects is discussed. Dusting is kept to a minimum with a mechanical volumetric type of spreader with a giant rotary vane feeder at the hopper base.

Harrison, G.

FUELS. THE FUTURE: UTILISATION: EFFICIENCY: LEGISLATION: STORAGE. Certificated Engr., 45(11):239-255, Nov. 1972. 6 refs.

Fuel usage and reserves; solid fuel combustion techniques and efficiency; combustion equipment, instrumentation, and automatic controls; legislation on smoke and combustion products control; and coal storage problems are reviewed. The use of coal as a primary fuel is discussed with particular application to South African reserves and economics. With modern appliances, coal can be burned cleanly and at efficiencies equal to any other fuel. The advantages of coal over other fuels include the low cost, potential for hand firing in emergencies, the wide variety of properties, ease of transport and storage, and safety from fire or explosion potentials.

Hata, Akio, Yutaka Kawano, Akio Yamaguchi, and Teruo Tanabe

AIR POLLUTION BY IRON AND STEEL PLANTS (TECHNICAL CONSIDERATION OF SOURCES). (Seitetsusho no taiki osen ni suite gijutsu men kara mita mondaiten (ho seitetsusho no gutairei yori)). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 161. (Nov. 7-9, Paper 116.)

Pollutants emitted by various types of furnaces of iron and steel works are discussed from the example of one plant. The dusts from the blast furnace generally contain 5-30 g/cu m dusts of iron oxide, sulfides and carbon. The emission concentration is 0.1 g/cu m and the total of more than 40 tons of dust are emitted monthly. At this plant, if the dust collectors are not operating for any reason, all of the dusts are discharged in the environment. From the blast furnace, 16.2% of the carbon monoxide content leaks into the atmosphere, and this is about 13 million cu m/mo CO. This is equivalent to exhaust emissions from 240,000 automobiles. A converter produces 10-15 kg/ton of dusts. Most dusts are ferrous oxide in the size of 0.3-1 micron. From three 60-ton furnaces, about 7 tons/mo of dusts are emitted. The soot leakage incidents are numerous, sometimes as often 184 incidents/mo. Six open hearth furnaces were operating until March 1971. The operation was discontinued, but after the dust collection, the emission concentration was as high as 0.5 g/cu m. Also, because of the addition of 300 kg fluoride per charge, 187 cu m/charge of hydrogen fluoride used to be created. One electric furnace of a 60-ton capacity produces 120-240 kg/ton/charge of dusts. The dusts contain chromium, nickel, manganese, molybdenum, and vanadium. The sintering pellet plant dusts contain a great quantity of sulfide and sulfur oxides. The amount of sulfur contained in the fuel at this plant is relatively low, but the total consumption is very large, and therefore, SOx emission is also large.

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APTIC NO. 49564

Hess, W.

SUPERVISION OF OIL HEATING INSTALLATIONS AS A CONTRIBUTION TO AIR HYGIENE. (Die Kontrolle der Hausfeuerungsanlagen als Beitrag zur Ortshygiene). Text in German. Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA, Basel, Switzerland, 1971, p. 230-242, 1972, 8 refs.

In 1963 and 1964, when the first inspections of exhaust gases from oil furnaces were made, approximately 40% of the heating installations in Zurich unduly polluted the atmosphere. Later such inspections became mandatory for Zurich and other communities. Measuring methods and instruments must be chosen with great care to give accurate results. In 1969, instructions on the control of oil furnaces were published. The average of objectionable furnaces in Switzerland is 35%, the highest proportion of badly regulated furnaces reaches 66%. One community has 90% objectionable furnaces. Incorrect servicing or functioning of oil furnaces causes large amounts of smoke, soot, and odor. A high technical level has been attained in furnace construction and production of oil burners. Air pollution is chiefly caused by defects due to attrition or incorrect servicing. Owners of such oil heaters are generally insufficiently informed or not concerned enough about air pollution. Periodic inspections are the only way to detect defects in oil heating installations and sources of undesirable emissions.

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APTIC NO. 49252

Hill, T. A., A. R. Siedle, and Roger Perry

CHEMICAL HAZARDS OF A FIRE-FIGHTING TRAINING ENVIRONMENT. Am. Ind. Hyg. Assoc. J., 33(6):423-430, June 1972, 15 refs.

Chemicals occurring in the vapor phase and on airborne soot from a diesel oil fire in a firefighting training structure were analyzed by mass spectrometry and gas chromatography. Forty-five hydrocarbon compounds from a grab sample of the atmosphere and seventeen aromatic structures from deposited soot were identified. Sampling procedures for chemical analysis of particulates for size, soot analysis, benzo(a)pyrene analysis, and procedures for analyzing gases, vapors and aerosols are discussed. Known carcinogens were found on the soot, and benzo(a)pyrene was quantitated fluorimetrically. The results suggest that a potential health hazard exists there.

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APTIC NO. 49193

Hishida, Kazuo, Hisao Nihei, Tsunehiro Yajima, and Yoshiteru Iwasaki

ODOR POLLUTION IN TOKYO -- EVALUATION OF ODORS, I. (Tokyo-to ni okeru akushu kogi no jitai -- Akushu no hyoka, I). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 172. (Nov. 7-9, Paper 127.)

The number of complaints against bad odor received by the Tokyo Metropolitan Government Public Nuisance Control Bureau increased from 219 in 1967 to 3481 in 1970, and 2290 between April and Sept. 1971 and 164 against toxic gases for the same period of 1971. The complaints were classified by emission sources. Bad odor-creating industries are varied in number, and the degree of nuisance cannot be measured by the number of factories involved, since the degree of unpleasantness vary. The number of complaints from residential areas were 386 of a total 970 cases investigated, 402 from industrial or sub-industrial areas, and 142 from commercial areas. The main sources of bad odor by classification were: 7535 printing factories, 2131 cleaning plants, 2157 stockyards, 1595 paint factories, 1115 rubber manufacturers, 214 animal skin, bone, fat, fur treatment plants, and 50 organic fertilizer manufacturing plants. Others are photography, chemical industries, fishmeal treatment, metal plating, food industries, automobile repair, automobile exhaust gases, leather dying, sewage tanks, rubber manufacturing, gasoline or gas stands,

boilers, incinerators, construction, metal fabrication, and sewage or rivers.

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APTIC NO. 49555

Hishida, Kazuo, Hisao Nihei, and Urara Sano

STUDIES ON EMISSION FACTORS FOR FUEL OIL COMBUSTION IN BOILERS. (Juyū boira no emissōn fakuta ni tsuite no kosatsu). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 156. (Nov. 7-9, Paper 111.)

At 12 representative installations pollutant measurements were taken, and fuel combustion boiler emission factors were calculated. They were compared with the indexes published by the United States Department of Health and Welfare. The pollutants measured were dusts, sulfur oxides, carbon monoxide, hydrocarbons, and nitrogen oxides, and the operation conditions of the boilers were studied. Samplings were taken for 8 consecutive hours as a unit, with 20 minute intervals. They were measured by Japanese Industrial Standards methods. In calculating, the factors of the combustion process effecting each pollutant emission were not known; since there was no published method available for calculating emission factors of a fuel oil combustion boiler, the method followed was devised by the team. In order to obtain a more accurate emission index, emissions from electric power plants and other large installation should be added. When using the data as reference materials for future air pollution control measures, the dust particle size distributions, the composition of NOx and the ratio of active components in HC must be examined. The indexes were: CO, 0.02 kg/ton of fuel + or 0.01, HC, 7.01 + or 1.18 for more than 200 sq m thermal conductive area; 1.75 + or 0.21 kg/ton HC for less than 200 sq m conductive area; total NOx, 3.43 + or 0.32, total SOx, 18.76 S + or 0.42 S, dusts, 2.66 + or - 0.31 for more than 100 sq m thermal conductivity surface area, 1.11 + or 0.25 dusts for less than 100 sq m.

27352

APTIC NO. 49790

Hoffman, Kenneth C.

THE UNITED STATES ENERGY SYSTEM A UNIFIED PLANNING FRAMEWORK. Polytechnic Inst. of Brooklyn, N. Y., Dept. of System Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1972, 186p, 132 refs.

A framework for strategic planning of the United States energy system was developed. The energy system is a complex structure made up of competing energy sources, delivery systems, and utilizing devices. The planning framework developed is a linear programming model of the energy system that focuses on the technical structure of that system, including the conversion efficiencies and environmental effects of supply and utilizing technologies. A wide range of fuel substitutability is incorporated in the model and the load-duration structure of electrical demands may be expressed. The model must be quantified for some future fixed time point and may be applied to determine the minimum cost allocation of alternate energy sources to serve specific energy demands such as space conditioning, automotive transport, iron production, and petrochemicals. The energy sources that compete in the optimization process can include central station electric systems, general purpose fuels delivered directly to the consumer, and special systems such as solar energy and decentralized electric generators. The energy demands to be satisfied, and the constraints on specific energy sources and environmental effects that are used in a planning evaluation, are specified exogenously and may be varied to determine the sensitivity of the optimal energy system to such variations. The optimization may be performed with respect to dollar costs, social costs, or environmental effects if these can be defined quantitatively, resource consumption, or some combination of these factors. In a base case that was analyzed to consider a year 2000 system with minimal technical advance over the current system, an energy resource consumption of

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221,000,000,000,000 Btu is indicated. By implementing several new technologies, resource consumption can be reduced to about 186,000,000,000,000 Btu.

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APTIC NO. 49492

Horompol, Imre

NATURAL-GAS ENGINE FOR CITY BUSES. (Foldgaz-motor varosi autobuszok szamara). Text in Hungarian. Jar-muvek, Mezogazd. Gepek, 19(11):404-406, Nov. 1972. 3 refs.

Advantages involved in the use of natural gas as a fuel for city buses, and natural gas-powered test buses developed by Mercedes-Benz and M.A.N. are described. A Mercedes-Benz Diesel bus engine was redesigned for natural gas, and the compression ratio was reduced from 16:1 to 11:1. The radius of action of the natural gas-powered vehicle is 200 km when natural gas is stored in high-pressure tanks, and at above 400 km when cryogenic tanks are used. Such vehicles comply with the emission standards according to the California test. The specific hydrocarbon emission from the Mercedes-Benz type bus was measured to be 3.8 g/PS/hr, and the carbon monoxide emission was 2 g/PS/hr. Natural gas-powered engines generate no solid combustion products and less noise than conventional models.

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APTIC NO. 49123

Ikegaya, Hiroshi

AIR POLLUTION BY FERRO-ALLOY OPEN ELECTRIC FURNACE. (Gokin testsu-yo kaiho gata denkiro no taiki osen ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 150. (Nov. 7-9, Paper 105.)

The difference in the smoke suction effect and dust collection effect for using an electric furnace for an iron and chromium alloy when giving and not giving the sintering pretreatment to the material ore was examined. The F-Cr dust composition, particle size distribution, suction air quantity, theoretical gas quantity, temperature fluctuation, and total dust quantity were examined. The particle size ratios when using the pretreatment of sintering were 0.4% 1.4 to 10 micron, 48.5% 10 to 40 micron, 10.3% 40 to 88 micron, and 40.8% 88 to 1200 micron. When untreated ore was used, these ratios were approximately 26%, 11%, 18%, and 28.4%. The friction caused by the F-Cr dusts is extremely large, and it is necessary to devise some countermeasures by a centrifugal inertial preduster, a chute, or a flow conveyor. The suction of the flue gas at the emission source in the case of an open electric furnace is difficult and the flow-in air magnification is large. Devices for the shape of the furnace hood and the operation method are necessary.

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APTIC NO. 49328

Janik, Miroslav and Jaroslav Kubat

THE PYROGENIC CHANGES OF PITCH AND OF ITS EXTRACTION COMPONENTS. (Pyrogenni zmeny smoly a jejich extrakcnich slozek). Text in Czech. Uhli, 20(11):468-473, 1972. 6 refs.

Pyrolytic changes of pitch and of its extraction components (methanol, acetone, benzene, and pyridine extracts) were studied by pyrolytic chromatography, by thermogravimetry, and by coking tests. Pyrolytic gas chromatography which analyzes gaseous and low-boiling products of pyrolysis (but not high-boiling multinuclear compounds) yielded on pyrograms peaks corresponding to pentane, 2-methyl butene-1, n-hexane, 2-methylpentane, cyclopentane, 2,4-dimethylpentane, methylcyclopentane, 3-ethylpentene-1, cyclohexane, methylcyclohexane, benzene, and toluene. Pitch components obtained by gradual extraction possessed chemical characteristics which changed with temperature. The lowest-boiling components decomposed already at 700 C if they had not evaporated already at lower temperatures. The remaining fractions decomposed by 40-50%; complete decomposition required either

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higher temperature or longer heating. Carbonization of the benzene and pyridine extracts and of the fraction insoluble in pyridine yielded a foamy residual coke of varying hardness. Porosity of the coke residue was highest in the benzene extract, lowest in coke residue from components insoluble in pyridine.

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APTIC NO. 49559

Jutzi, W.

AIR POLLUTION AND ITS CONTROL IN SWITZERLAND. (Reinhaltung und Verschmutzung der Luft in der Schweiz). Text in German. Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA, Basel, Switzerland, 1971, p. 142-154, 1972. 7 refs.

Although Switzerland lies in the center of a vast polluted area, its contribution to air pollution is very small; thus, international pollution control is important to Switzerland. Until 1965, Switzerland's air pollution was chiefly dust and smoke caused by industries. Anti-pollution measures since then resulted in a perceptible reduction of pollution. Nevertheless, a number of problems caused by dust emissions must still be solved, especially those derived from smoke emitted in certain high temperature processes (such as the production of carbide and ferro-silicon). Gaseous and vapor pollution has increased in importance. Odors were the cause of many complaints in the last few years; preventive measures have been taken but no satisfactory improvement has occurred. Recently, fuel oil has been replacing more and more solid fuels in combustion, and fuel consumption overall is increasing. Although the sulfur content in fuel is decreasing, more sulfur dioxide is being produced. Motor vehicle control methods are insufficient; many cars still emit too much smoke (diesel engine) or too much carbon monoxide (gasoline engine).

27357

APTIC NO. 49162

Kado, Satoshi

CORROSION OF STEEL MATERIAL BY FLUE GAS FROM OIL COMBUSTION AND ITS PREVENTION.

(Nensho haigasu-chu ni okeru kozai no fushoku boshokuhon ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(10):937-948, Oct. 1972. 11 refs.

Combustion of a mixture fuel oil and plastic material in waste incineration creates the problems of corrosion of boilers and stacks by gases such as sulfur dioxide and hydrogen chloride. The damages in the low temperature part of a boiler or a stack are caused by sulfuric acid formed by SO₂ gas and sulfur trioxide gas in the combustion gas. Various chemical theories concerning this phenomenon are presented. As countermeasures, selection of fuels, fuel refining, improvements on combustion methods, designing of furnaces, examination of combustion facilities, the use of additives, desulfurization of flue gas, and the use of anti-corrosive material are discussed. Under the influence of sulfuric acid, a low alloy steel is much more effective as an anti-corrosive than high alloy steel such as 18 Cr-8Ni. Steel stacks lined with expensive granite also show chemical deterioration and physical damages; coagulated sulfuric acid often penetrates into steel through the cracks. With the recent emphasis on stack gas desulfurization and strict emission standards, future stacks will be constructed using anti-sulfuric acid type of steel without using the costly lining. In general, an incinerator stack gas has less SO₂ than a fuel boiler's combustion gas; but the HCl content is extremely high. This causes stacks and incinerator to corrode by dew point chlorine. According to experiments conducted on various stainless steel, S-TEN steel showed the highest resistance against chlorine corrosion.

27358

APTIC NO. 49986

Kamiya, Junkichi

OUTLOOK OF EFFECTIVE UTILIZATION OF WASTE PLASTICS. (Hai purasuchikku yuko riyo no tenbo). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(7):34-36, July 1972. 24 refs.

With enforcement of the law concerning disposal and cleaning of waste matter, the Government, local autonomous bodies, enterprises, and consumers are all held responsible legally for disposal of waste matter. The law also stipulates responsibility of the national government to provide the local autonomous bodies with necessary technical and financial assistance for disposal of the wastes. The development of new disposal methods and/or new plastics is a goal of the law. The waste plastics can be reutilized as useful materials, decomposed and reduced to gas or oil for use as fuel or chemical material, or incinerated in incinerators designed to produce steam or hot water. A committee has been set up to conduct more organized and systematic study of effective utilization of the waste plastics. A Government subsidized organization to be tentatively called the Waste Plastics Effective Utilization Promotion Association is to be set up this year. There is a similar organization set up by three industrial associations.

27359

APTIC NO. 49809

Kelley, Conard M.

NEW DEVELOPMENTS IN HIGHWAY STABILIZATION FIELD. Preprint, National Lime Association, Washington, D. C., 5p., 1972. (Presented at the National Lime Association, Annual Convention, 70th, Hot Springs, Va., May 2, 1972.)

Recent developments in the lime stabilization field include the use of lime in the entire fill of an interstate highway in Louisiana. The bottom 6-inch layer was stabilized first to form a working table. A small amount of lime (15%) was then used in the entire fill to expedite construction by drying the soil and promoting rapid compaction. Finally, the top 6-inch layer was completely stabilized to form the lower layer of the pavement structure. Lime is also being used in a railroad track foundation project, to reinforce levees along the Mississippi, to stabilize soil at airports, in parking lot construction, and to upgrade asphalt pavements. The effect of lime on the resilient modulus of various aggregates in asphalt mixes is shown, and steps to minimize the effect of moisture on the loss of the resilient modulus of the mixes are outlined.

27360

APTIC NO. 49309

Kubota, Kimio, Toshio Ohira, Yasuo Iida, and Hajime Saito

RESEARCH ON PREVENTION OF BLACK SMOKE EMISSIONS BY DIESEL AUTOMOBILE. (*Diizeru-jidosha no haikikokuen boshi ni kansuru chosakenkyu*). Text in Japanese. Tokyo-to-Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 3:89-92, March 1972. 3 refs.

Six barium fuel additives added at 0.5-1.0% reduced black smoke from a diesel engine by 50-70%. These additives were tested for smoke-reducing effect during acceleration and climbing for barium exhaust emissions, and for effects on engine parts. The additives had the same effects during acceleration, deceleration, lugging, and normal driving. The exhaust gas contained 85-95% of the barium additive. Some soluble barium adhered to the interior of cylinders and exhaust pipes, causing corrosion. When the additive was used, carbon monoxide increased slightly and carbon dioxide increased by 2%. Oxygen decreased proportionately. Hydrocarbons and nitrogen oxides remained unchanged. Barium oxide was found on the underside of the cylinder head, intake valve, and piston head. The exhaust valve seat became more pitted with the additive. No adverse effect on fuel consumption or lubricants occurred.

27361

APTIC NO. 49349

Kubota, K., T. Odaira, Y. Iida, and T. Sato

RESEARCH ON THE SUPPRESSION OF DIESEL ENGINE EXHAUST SMOKE (2ND REPORT). In: *Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection*. Tokyo Metropolitan Environmental Protection Research Inst. (Japan), p. 16-20, 1972. 3 refs.

The effect of a barium fuel additive on diesel engine exhaust smoke density and on the engine, as well as barium concentrations in engine exhaust were studied. Barium reduced the density of exhausted fumes by 50 to 70% during acceleration, deceleration, lugging, and under stationary conditions. Some 85 to 95% of the added barium was discharged into air with the exhaust gases. Of the discharged barium, 85 to 90% is an insoluble substance believed to be barium sulfate. The carbon monoxide concentration in the exhaust slightly increased and carbon dioxide also increased by 2% due to the use of barium as additive. As the oxygen concentration decreased accordingly, partial conversion of the soot into CO and CO₂ is assumed. No change in the total quantity of hydrocarbons and nitrogen oxides in the diesel engine exhaust was observed. The engines of the test vehicles having run 50,000 km in tests displayed white and grey deposits assumed to be barium oxides on the undersides of the cylinder head and over the exhaust valve, while the wear of the inside wall of the cylinders was negligible. The seat of the exhaust valve was pockmarked possibly due to corrosion by carbon. The fuel consumption was not affected significantly by additive use.

27362

APTIC NO. 49395

Kubota, Kimio, Toshio Ohira, Yasuo Iida, and Hajime Saito

RESEARCH ON AUTOMOBILE DRIVING IN THE TOKYO METROPOLITAN AREA (2ND REPORT). (*Tonai jidosha no sokojotai no chosakenkyu (Dai 2-ho)*). Text in Japanese. Tokyo-to-Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 3:85-88, March 1972. 3 refs.

A test automobile was driven along main automobile routes in Tokyo at selected hours to cover a wide range of traffic conditions to obtain the average daily driving pattern. The rpm was more important than the running speed of the automobile since the test tried to establish a driving mode pattern meaningful to future automotive exhaust tests. Idling accounted for over 30% of the driving time. Driving at 40-45 km/hr accounted for 10%. The greatest portion of the driving time occurred at 1800-2200 rpm. Idling accounted for 34% of the time when analyzed by four-mode driving. Constant speed driving decreased compared with the previous year. Idling, acceleration, constant speed driving, and deceleration were the basic driving modes; intermediate accelerations and decelerations were also required frequently when driving in Tokyo. An eight-mode drive pattern probably occurred which is compared to the Japanese four-mode pattern and the American seven-mode pattern.

27363

APTIC NO. 49852

Kudrna, Jan

EXHALATION OF HARMFUL SUBSTANCES FROM BRICKWORK KILNS. (*Exhalace škodlivin z cihlarských pecí*). Text in Czech. Stavivo, 50(3): 69-70, 1972. 3 refs.

Measurements of particulate emissions from brickwork kilns disclosed that they do not as a rule exceed prescribed norms, but excessive emission does occur in the case of old oil-fired kilns where the injection of oil into areas below 900 C or deficiency of air causes excessive soot formation. This defect can be removed by the injection of secondary air into the burners. Similar excessive emissions of soot by coal-fired kilns cannot be remedied. Hydrogen sulfide is rarely emitted as a pollutant; the real problem is sulfur dioxide. Measurements of SO₂ emissions from 59 brickwork kilns were carried out in the German Democratic Republic. Maximal sulfur oxide concentrations were below 3 g/N cu m; the mean value of emissions from all kilns was 0.49 g/N cu m with an average stack height of 30-50 m. Sulfur trioxide is more harmful than SO₂ and its noxious effect cannot be underrated because the bricks inside the kilns act as catalysts; consequently brickwork kilns emit a greater share of SO₃ than other furnaces. The sulfuric acid formed is absorbed by the soot flakes. The share of SO₃ of total sulfur oxides emission is on the average 25% but can reach 50%. Sulfur oxides can originate occasionally from brick clay; on the

other hand, calcium carbonate dispersed in bricks in the course of firing combines with sulfur and prevents part of it from forming oxides. Many clays contain calcium fluoride, the mean content is 0.063%. In the firing 16% is emitted, 80% of the fluorine remains in the material. Fluorine emission fluctuates between 1 and 180 mg/N cu m with an average of 48 mg/N cu m. The sulfur oxides emission problem could be solved by using oil with a low sulfur content.

27364

APTIC NO. 49137

Lindermaier, Heinrich

A 3.2 MW STEAM TURBINE SYSTEM WITH CONDENSATION PLANT SYSTEM HELLER OF THE REFUSE INCINERATION PLANT I IN VIENNA. (3.2 MW Dampfturbosatz mit Kondensationsanlage System Heller Der Muellverbrennungsanlage I in Wien). Text in German. *Brennstoff- Waerme-Kraft*, 24(12):445-447, Dec. 1972.

The city of Vienna decided to install in its refuse incineration plant a condensation steam turbine system which transforms the steam into electrical energy. About 25% of the generated power is used for the refuse incineration plant itself and 75% is led into the public power supply system. Three incineration furnaces are equipped with one boiler each having a refuse demand of 8000 kg/hr each. The three boilers feed a turbine which drives a rotary current synchronized generator. The waste steam from the turbine is led into a condenser where it is mixed with a cooling condensate. This mixture is divided into one stream of cooling condensate and one of boiler water. The cooling condensate is pumped through the cooling elements in the dry cooling tower where it is cooled back and fed again into the mixing condenser. The condensation cycle is completely closed so that water and condensation losses are avoided. The boiler water is pumped from the condensate line into containers, and it is fed through a preheater into the boiler again. The cooling tower consists of 12 cooling columns two of which form a cooling delta. The cooling elements consist of small rib heat exchangers. The cooling capacity is controlled by changing the quantity of cooling air by means of flaps in the side walls of the cooling tower.

27365

APTIC NO. 49584

Nagata, Katsuya, Masakazu Yamazaki, and Kunito Yamazaki

GENERATION OF NITROGEN OXIDES IN A COMBUSTION DEVICE AND ITS CONTROL MEASURES: EFFECT OF IN-FURNACE AIR/FUEL MIXING CHARACTERISTICS ON GENERATION OF NITROGEN OXIDES. (*Nenshosochi ni okeru chissosankabutsu no hassei ni sono yokushitaisaku; Chissosankabutsu hassei ni oyobosu ronai kongo tokusei no eikyo*). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Kansai Branch p. 43-45, 1972. 5 refs. (Presented at the Japan Society of Mechanical Engineers Kansai Branch, Lecture Meeting, 229th, Osaka, Japan Nov. 2, 1972.)

Using a specially designed combustion furnace, the relationship between the air/fuel mixing characteristic in the furnace and the nitrogen oxide formation was examined. In this experiment, the fuel flow quantity, the pre-mixing air quantity, and the swirler angle were set to remain constant throughout, so that factors affecting the air/fuel mixing state in the furnace would be limited to the fuel jet velocity and the swirling air current velocity only. The swirling air coming out of the swirler accounted for most of the flow quantity fed into the combustion chamber. Therefore, the flow pattern in the furnace must have been predominantly governed by this swirling flow of the air while the mixing process of the fuel jet and swirling air current taking place near the burner tip dominated the in-furnace mixing characteristic. Change of the air/fuel mixing state in the furnace was taken as the ratio between the fuel jet momentum and the swirling air current momentum. The relationship between this momentum ratio and the NOx emission was then examined, using the air ratio as the param-

ter. The NOx emission from a small-sized furnace fueled by propane was considerably affected by the in-furnace air/fuel mixing characteristic. The NOx emission was highest in a certain state of the air/fuel mixing and decreased whether the mixing state became better or poorer. That certain state of the air/fuel mixing and the air/fuel ratio in the combustion sphere dominates the NOx emission more than the air ratio in the stage of feeding into the combustion chamber.

27366

APTIC NO. 49265

Nakano, Nobuhiko and Kazuo Kimura

DIFFUSION OF AUTOMOBILE EXHAUST GAS USING TRACER GAS. (*Toresa gadu ni yoru jidosha hiki gasu no kakusan ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 294. (Nov. 7-9, Paper 248.)

The automotive exhaust gas diffusion pattern was examined using various tracer gases. The gases used were sulfur hexafluoride, freon 11, freon 13, and freon 21. A tracer gas emission apparatus was installed in a car. The apparatus included a tracer gas pump, a quantitation pump, two heaters, two recorders, a thermocouple, and an engine. The amount of tracer gas emission was measured by the liquid quantitation pump or a flowmeter. The first heater was used for the evaporation heat of the tracer gas, and the second heater was used for maintaining the temperature of the tracer gas at the level of the automotive emission gas. The temperature was measured by the thermocouple. A portable motor was installed on the rack outside the car. A battery was used as the power source for meters. A 25 ml polyethylene injector was used for gas sampling. Gas chromatography was used for analyses. Activated carbon and chromosol 102 were used for column packing. Very good results were obtained by the above method.

27367

APTIC NO. 49188

Nakao, Shozo, Mitsuo Moro, and Ichiro Matsuda

COMPONENTS OF EMISSION FROM FUEL OIL COMBUSTION, ESPECIALLY ON THE GENERATION OF ACETONE. (*Juyu nensho boira haigasu sosei no kaiseki, tokuni keton rui no seisei ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 152. (Nov. 7-9, Paper 107.)

An analysis was given to the flue gas of a fuel oil boiler in order to see its organic components. City-sold oil with 85-87% carbon, 12.5-13.7% hydrogen, and 0.7-1.3% sulfur content was used. The boiler was a water pipe type with the 100 cu m heat conducting surface. The combustion temperature was 1300-1400 C, and the oxygen partial pressure was 6-8%. Samplings were taken by the cooling adsorption method, cooling catalyst method, and the direct method. Gas chromatography was used for the analyses. The main component of hydrocarbon was acetone, with some aromatic hydrocarbons; there were no low class hydrocarbons. The components were 100-200 ppm of acetone, 100-200 ppm of nitric oxide, and 500 ppm of sulfur oxides.

27368

APTIC NO. 49324

Nishii, T., M. Murakami, and Y. Masaoka

LEAD IN SAND AND SOIL GRAINS ON A STREET AND AT A CONSTRUCTION SITE. (*Rojo dosachu no namari ni tsuite*). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):414, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

An appraisal of the degree of lead pollution was attempted by measuring the lead concentration of sand-soil grains on a street. Testing material was collected by sweeping up grains at 16 metropolitan intersections, six intersections of suburban Tokyo, four of rural medium-sized cities, and at four street intersections. After drying the samples out in a desiccator for 2 days and nights, the samples were divided by a mesh and the

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finer parts were selected. About 100 mg of fine particles were measured by an atomic extension spectrometer, after ashing in a low-temperature ashing apparatus and rendering in 2 ml of 10% nitric acid. At a school construction site, the soils taken at every meter in distance and up to 5 m in depth were analyzed and measured. Lead concentrations decreased with increase of depth from the surface. Average lead concentrations of four measured values for each of the 16 metropolitan intersections, the six intersections of suburban Tokyo, and the rural medium-sized cities are shown. A considerable difference by area was found. Strong correlations were observed between the average lead concentration per intersection and traffic volume, and between the concentration per measured spot and traffic volume at that spot. The relationship of lead concentration between sand-soil grains and the traffic volume of measured spots in metropolitan Tokyo is given in a graph.

27369

APTIC NO. 49616

Ogata, Kazuo

SAFETY AND HYGIENE OF INCINERATOR WORKERS. (*Shokyakuro sagyosha no anzen eisei*). Text in Japanese. *Kagaku Kojo (Chem. Factory)*, 16(7):29-33, July 1972.

The committee to study prevention of troubles caused by synthetic resins set up by the Ministry of Labor in Japan has reported that there are 49 kinds of gases emitted by the pyrolysis of nine representative kinds of plastics. Methyl acrylate, acetone, ammonia, isocyanate, ethyl chloride, and hydrogen chloride are some of the toxic gases emitted. The workers engaged in incineration of waste plastics are also likely to be exposed to heavy metals, dusts, and ashes. The harmful components of the ash/residue with their allowable limit concentrations are also shown. They include zinc, antimony, cadmium, zirconium, tin, barium, manganese, and lead. Three cases of poisoning from plastic combustion and one case poisoning from incinerators are mentioned, involving 66 persons in all. The incinerator worker case was analyzed to find preventive measures. The chief cause for worker poisoning in a batch-type incinerator is the combustion gas flowing back from the feed-in port of the incinerator. Analyzed by the Dithizon method, the lead content of the combustion gas in the incinerator in question was 2-17 micrograms/cu m in March and 4-30 micrograms/cu m in June. Seventeen micrograms, was measured in March in front of workers at the feed-in port of the incinerator. Thirty micrograms was measured about 55 cm above the feed-in port during the feed-in operation. The intensity of labor is another factor affecting the worker's poisoning. Use of protective masks and life preservers is discussed for handling of the ash and similar residues.

27370

APTIC NO. 49230

Ohm, A.

HALOGENATED HYDROCARBONS IN FIRE DAMAGE PREVENTION. (*Halogenkoolwaterstoffen toegepast bij de brandschadepreventie*). Text in Dutch. *Polytech. Tijdschr., Ed. Procestechniek (The Hague)*, 27(26):865-867, Dec. 20, 1972. 7 refs.

Hygienic and toxicological aspects of halogenated hydrocarbons used as vaporizing liquid fire extinguishing agents are reviewed. Halogenated hydrocarbons such as carbon tetrachloride, methyl bromide, chlorobromomethane, bromochlorodifluoromethane, 1,1,1-trichloroethane, bromotrifluoromethane, dibromodifluoromethane, and 1,2-dibromotetrafluoroethane are narcotic, and may attack the lung, the central nervous system, or the kidney. The maximum allowable concentrations of most of these halogenated hydrocarbons are below the respective odor thresholds. Both chronic and acute poisoning due to the original compounds and their metabolites such as hydrochloric acid, bromic acid, hydrofluoric acid, and phosphoric acid are possible. The dangerous concentrations (lowest value of the approximate lethal concentration found in various test animals) of CCl_4 , CH_3Br ,

CH_2ClBr , CF_2ClBr , CH_3CCl_3 and CF_3Br are 0.081, 0.025, 0.147, 1.76, 0.123, and 2.4 kg/cu m, respectively. The use of CF_3Br , CF_2ClBr , and CH_2ClBr is recommended from toxicological considerations.

27371

APTIC NO. 49486

Olds, Fredric C.

THE ENERGY SITUATION. *Nucl. Eng. Design*, 23(2):121-140, Nov. 1972. 14 refs. (Presented at the AUA-ANL Nuclear Engineering Education Conference, 13th, Argonne, Ill., Jan. 31 - Feb. 1, 1972.)

Nuclear power within the context of the world energy picture from the point of view of the United States energy situation is discussed. The major factors to consider in world energy matters include energy consumption, raw energy sources, foreign and domestic policies, international trade, population growth, pollution matters and laws, and international trade routes, controls, and economic measures. Energy requirements are predicted to double in the decade. Energy consumption data and trends in the consumption of nuclear power, coal, petroleum, and natural gas are reviewed. Fuel reserves, coal gasification potentials, uranium supplies, and data on breeder costs and construction are discussed.

27372

APTIC NO. 49171

Popescu-Ghimpati, Cristina

FAILURES IN THE OPERATION OF POWER PLANT CHIMNEYS. (*Avarii semnalate in exploatarea cosurilor de fum din centralele electrice*). Text in Romanian. *Energetica (Bucharest)*, 20(1): 524-532, Nov. 1972. 8 refs.

Damages occurring in electric power plant stacks related to their construction material and design, as well as to agents and conditions producing such deteriorations are reviewed. A wide flexibility of the interior stack coating is required to provide resistance against gas temperature fluctuations caused by variations that might occur in the combustion conditions. Excessive thermal tensions, too short structure drying periods before subjecting a stack to operating conditions, and corrosion processes resulting from the formation of acid condensates are among the main factors involved in stack damage. The latter occur when operating conditions below their dewpoint and under increased fuel consumption conditions are used. Reinforced concrete-made stacks have their calcium carbonate constituent converted into calcium sulfate due to contact with acid condensates. Acid condensates result from the oxidation of sulfur contained in the fuel by the air, introduced into the burner, to sulfur dioxide; the conversion of this latter into sulfur trioxide is promoted by excess air, decreased temperatures, and nitrogen oxides acting as catalysts. Sulfuric and sulfurous acids, hydrochloric acid and nitric acid constitute the main acid condensate components. Deterioration of concrete stacks appears as white patches on their external walls and as cracks in both internal and external walls. Steel stacks exhibit visible gas leaks upon corrosive deterioration. To control such incidents, inspection regulations and procedures should be developed.

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APTIC NO. 49750

Ramey, James T.

ENERGY NEEDS OF THE NATION AND THE COST IN TERMS OF POLLUTION. *Federation Proc.*, 31(6):1559-1568, Nov.-Dec. 1972. 17 refs.

Current trends in the energy field in the U. S., and environmental problems associated with the production and use of energy are outlined. Coal presently supplies only about 20% of the energy needs, while oil and natural gas have increased to about 76%, with the remainder being largely water power at 4%. Nuclear energy now accounts for less than 1% of the total. The energy use in the year 2000 is expected to be approximately 2.5 times the 1970 rate. Electricity use is expected to continue to rise faster than the other primary energy uses

and could account for about 1/2 of the country's gross consumption of energy in 2000. Fast breeder reactors, and, at a more-distant future, fusion power, will open up practically unlimited resources of energy. Meanwhile, roughly 85% of all air pollution in the U. S. is associated with the combustion of fossil fuels, with carbon monoxide, sulfur oxides, nitrogen oxides, hydrocarbons, and particulate matter being the principal pollutants. Most of the pollution comes from vehicles and fossil power plants. Exposure to low concentrations of air pollutants can cause chronic disease and premature deaths. Major illnesses linked to air pollution include emphysema, bronchitis, asthma, and lung cancer. Coal and oil produce the most pollutants when burned. Coal accounts for nearly 2/3 of the sulfur oxides in the atmosphere, and nearly 1/3 of the particulate matter. The burning of oil contributes large amounts of CO, hydrocarbons, and nitrogen oxides. Natural gas is the cleanest of the fossil fuels. The use of nuclear power will result in a significant reduction in the amount of combustion pollutants released to the environment. Through good planning, management, and organization, the energy needs and the environmental effects associated with energy production and use can be harmonized with minimum adverse effects. Increasing power plant efficiency and mass transportation are essential means of saving energy and abating air pollution.

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APTIC NO. 49754

Reulein H., G. Reyl, and I. Killmann

EXHAUST GAS PROBLEMS WITH AUTOMOBILE DIESEL ENGINES. (Abgasprobleme bei Fahrzeug-Dieselmotoren). Text in German. *Motortech. Z. (Stuttgart)*, 33(12):455-463, Dec. 1972. 16 refs.

A review is given of the pollutant emissions from diesel engines exhausts. Direct injection diesel engines emit between 0.2 and 0.3 g/cu m soot, 1000 and 1500 ppm carbon monoxide, 1500 and 2000 ppm nitrogen oxides, 500 and 1000 ppm hydrocarbons; chamber engines emit between 0.10 and 0.15 g/cu m of soot, 300 and 500 ppm CO, 700 and 1000 ppm NOx, and 200 to 300 ppm hydrocarbons. Both types of engines emit between 100 and 200 ppm of sulfur dioxide. Only soot is subject to legal regulations in West Germany and United States. Beginning with 1973, the gaseous pollutants CO, NOx, and HC will be limited. A comparison of the soot emissions of various diesel engines shows that the limit value recommended by the Economic Commission of Europe is not exceeded; the gaseous pollutant emissions are not higher than the limit values going into effect in the United States in 1973. The limit value for NOx plus HC of 5 g/HPH which should go into effect in California in 1975, however, is exceeded by all engines except several experimental engines. The engine with divided combustion does not have the power of the direct injection engine but its exhaust gas quality is much better. The NOx are impressively low at high load, the hydrocarbons are low at small load. The exhaust gas quality can be further improved by delaying the pumping stroke, by exhaust gas recirculation, and by water injection into the combustion chamber. These measures will not reduce the engine performance (power); however, dilution of the lubricant and higher wear may be the consequence of water injection.

27375

APTIC NO. 49791

Sampson, Robert E.

PARTICULATE CONCENTRATION AND SIZE DISTRIBUTION IN SPARK IGNITION ENGINE EXHAUST. Michigan Univ., Ann Arbor, Dept. of Mechanical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 76p. 28 refs.

Particulate concentration and size distribution in spark ignition engine exhaust, and factors influencing these parameters were studied on a test engine. Both the temperature and lead content of the fuel affected the particle concentration in the exhaust gas. For leaded fuel the particulate concentration decreased from 85 to 450 F, remained constant up to about

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700 F, and then decreased sharply. With unleaded fuel, the decrease above 700 F, was not observed. The particle concentration with leaded fuel was approximately six times higher than with unleaded fuel. The size distribution of particles appeared to be insensitive to temperature up to about 700 F, but was dependent upon fuel composition. For leaded fuel, the exhaust contained about eight times more small particles (smaller than 0.36 micron) than for unleaded fuel, but both fuels contained approximately the same number of large particles. Deposition of particles along the exhaust system varied with both the fuel used and with the distance along the exhaust stream. However, during a given period of time the weight of the deposited particles was found to be less than 10% of the weight of the particle concentration in the exhaust stream.

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APTIC NO. 49192

Sarbo, Gyorgy

LONG-TERM ENERGY SUPPLY CONCEPTION FOR THE TOWN OF SZIGETVAR (HUNGARY). *Szigetvaros tavlati energiaellatasi koncepcioja*. Text in Hungarian. *Energiagazdalkodas*, 13(12):569-574, Dec. 1972.

The concept of the long-term energy supply of the town of Szigetvar, Hungary (10,500 inhabitants), including industrial and municipal facilities, is described. The thermal energy demands of industrial plants are satisfied by means of boilers. A combined increase of 83% in the energy carrier demand of the industry in the 1970-1980 period is expected. The respective increases in the coal, coke plus firewood, fuel oil plus gas oil, gasoline, and electricity will be 12%, 13%, 13.4%, and 24.6%, respectively. Road transport is increasing at the expense of railroad traffic. During the same period, the energy demand of municipal facilities is expected to be 86%. With solid fuel consumption remaining unchanged, the gasoline and liquefied petroleum gas consumption will be doubled. Remote heating, first for municipal facilities and homes, and later also of industrial plants, will be considerably expanded.

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APTIC NO. 49588

Schulz, Hans and Rolf Guenther

LACQUER APPLICATION AND MAINTENANCE OF CLEAN AIR - STUDIES OF THE ORGANIC SUBSTANCES FROM LACQUER BINDING AGENTS IN THE WASTE AIR OF LACQUER DRYERS. (Lackverarbeitung und Luftreinhaltung - Untersuchungen ueber die bei der Lacktrocknung in Durchlauföfen in der Trocknungsabluft auftretenden organischen Substanzen aus den Lackbindemitteln). Text in German. *Staub. Reinhaltung Luft*, 32(12):471-478, Dec. 1972. 25 refs.

The components of the waste air from lacquer drying in the thin sheet packing and automobile industry were identified and quantitatively determined. The organic components were separated from the great mass of inert gases by condensates at the temperature of liquid air. The waste gas condensates were recovered from the cold traps by vacuum distillation and extraction. For analysis of the various components in the waste gas condensate, gas chromatography was used. Of the health hazardous substances, mainly phenols, phthalic acid compounds, and methacrylic acid esters were found. More than 90% of these compounds developed in the front flues of technical dryers. Concentrations of phenol of up to 92 mg/cu m air were measured, while the maximum allowable emission concentration is 0.2 mg/cu m. The concentrations of formaldehyde and ammonia (10 and 21 mg/cu m) were likewise very high. The concentrations of butene (920 mg/cu m) and ethylglycol (550 mg/cu m) were also considerably higher than the maximum allowable emission concentrations. Drying experiments at various temperatures permit the conclusion that more than 2/3 of these components from the binding agents are no real cracking products. They are present in the binding agents in low-molecular form. Through evaporation they get into the waste gas together with the solvent. Real cracking products are formed in larger quantities at higher tempera-

tures. With nitrogen as a drying gas, the resin formation is delayed. The thermal dissociation alone does not increase the waste gas products, not even at a drying temperature of about 240 C.

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APTIC NO. 49974

Smith, Malcolm and Lou Ann McAdams

EFFECTS OF GASOLINE ADDITIVES ON CARBURETOR AND PCV SYSTEM PERFORMANCE AS THEY RELATE TO EXHAUST EMISSIONS. (FINAL REPORT). Scott Research Labs., Inc., San Bernardino, Calif., Coordinating Research Council and Office of Air Programs APRAC Proj. CAPE-2-68, Rept. SRL-2873-05-0172, 219p., Jan. 19, 1972.

Forty-eight vehicles were driven in urban and suburban modes of operation for at least 12,000 mi. Three groups of 16 cars each were operated on the same base fuel, with two of the fuels modified with additives. Exhaust emissions, positive crankcase ventilation (PCV) valve flow, and idle rpm (for 19 dependent variables) were measured when the vehicles started the test and at each subsequent 4000-mile interval through 12,000 mi. End-of-test measurements of the same variables were made on a subset of vehicles driven more than 12,000 mi. Significant differences among fuels, makes, mileage intervals, and their interactions on each variable are evaluated statistically. Fuels containing the gasoline additives had lower carbon monoxide emissions than those operated on the nonadditive fuel. The lower CO emissions were accompanied by increases in carbon dioxide. The higher CO emissions for vehicles operated on the nonadditive fuel were probably caused by carburetor body deposits. There appeared to be no differences in the deposit levels or flow of the PCV valves between the vehicles using the three different fuels. There was a statistically significant increase in PCV valve flow with mileage. There was also a statistically significant effect of mileage interval on seven-mode hydrocarbons and on steady-state hydrocarbons, as measured by non-dispersive infrared spectrometry. The fuel by mileage interaction was significant for HC at idle and at 40 mph. The make effect was significant for all dependent variables except idle rpm and idle oxygen. (Author summary modified)

27379

APTIC NO. 49166

Stevens, C. M., L. Krout, D. Walling, and A. Venters

THE ISOTOPIC COMPOSITION OF ATMOSPHERIC CARBON MONOXIDE. *Earth Planet. Sci. Lett.*, 16(2):147-165, Oct. 1972. 32 refs.

The carbon and oxygen isotopic composition of atmospheric carbon monoxide was determined in urban air collected for a number of major cities in the United States and Europe, as well as rural Illinois sites. The isotopic concentration of the northern hemisphere showed regular seasonal variations. The isotopic pattern is different from that for CO from automobile engine combustion, whether compared to combustion in the same region as the air sample or to an estimated world average. Isotopic fractionation and meteorologic effects were also studied. There were several natural sources, one of which was much greater than anthropogenic emissions. Varieties of atmospheric CO with low $\delta(18)/\delta(16)$ ratio dominated during the northern hemisphere summer. This form is produced year-round and originates from the atmosphere itself. Oxidation of atmospheric methane is a suggested source of the light carbon species of this variety and oxidation of other organic constituents of the atmosphere from either marine or terrestrial origin may account for the heavy carbon species. The production rate is estimated to be greater than 3 times 10^{10} to the 9th power t/yr, compared to 2.7 times 10^{10} to the 8th power t/yr from man-made sources. A large burst in the concentration of a heavy-oxygen variety of CO occurred in the autumn, probably derived from the degradation of plant life chlorophyll. Another variety with a heavy-oxygen composition occurred during the winter and spring in northern midlatitudes.

Anthropogenic emissions from engines and residential heating could be significant constituents of this variety. A small variable amount of a heavy-oxygen CO variety occurred during the summer.

27380

APTIC NO. 49254

Sudworth, J. L.

THE SODIUM/SULPHUR BATTERY. *Sulphur Inst. J.*, 8(4):12-15, 1972. 6 refs.

The design, principles of operation, and applications of a sodium/sulfur battery are reviewed. The battery has a specific energy greater than the lead/acid battery by an order of magnitude; the operating temperature of 350 C, however, limits battery application by size and utilization factor. The application which best meets the requirements is traction, e.g., rail traction. Apart from railway vehicles, many road transport vehicles could be powered by batteries. Problems for further research include the limited life of the solid electrolyte, corrosion of the cell wall by sulfide melts, and the scale-up to multikilowatt batteries.

27381

APTIC NO. 49266

Tsuiji, Masahiko and Toshihide Okuno

THE GC ANALYSIS OF CARBONYL SULFIDE EMITTED BY THE VISCOSE PLANT. (*Bisucosu koyo yori hassei suru ryuka karuboniru no bunseki*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 119. (Nov. 7-9, Paper 74.)

The sulfide emission of a viscose plant (rayon manufacturing) and its environment were analyzed by gas chromatography, and the three peaks were confirmed as carbonyl sulfide, hydrogen sulfide, and carbon disulfide. The column used a 60-80 mesh silicagel a flame photometric detector. A carbonyl sulfide standard gas was prepared and calibrated. At this plant, when the alkaline scrubber is in operation, the emission is 80 ppm; when it is not operating, the concentration is 81 ppm. The concentration at the exit of the collective stack is 10 ppm whether or not the scrubber is in operation. Carbonyl sulfide goes through the scrubber without any reaction and is emitted in the area. In the boundary of the plant, a maximum of 430 ppb was detected; in the environment, 119 ppb at 500 m, 120 at 100 m, 96 at 1500, and 82 at 2000 m were detected. In the lee, the concentration was as high as 128 ppb even with the distance of 2500 m.

27382

APTIC NO. 49148

Vasilescu, C. A.

FUEL-MEDIATED SPARK IGNITION ENGINE-GENERATED POLLUTION CONTROL. (*Combatearea poluarii produse de motoarele cu aprindere prin scintee prin intermediul combustibilului*). Text in Romanian. Stud. Cercet. Energ. Electrotech., 32(2):305-313, 1972. 7 refs. (Presented at the Symposium on Environmental Pollution Control, Romania Socialist Republic Academy Environmental Pollution Control Commission, 3rd, Nov. 23, 1971.)

To provide minimum fuel generated pollution from spark ignition engines, gasolines should contain no alkenes (olefins) and should include high explosion resistance constituents such as isoalkanes and aromatic hydrocarbons. The isoalkanes and aromatic hydrocarbons could be derived from catalytic reforming gasolines or from thermal reforming of catalytic, reformed gasolines. Alkene-containing fractions will be applicable only after their alkylation or hydrogenation. Sulfur content should be decreased to the minimum possible levels, while nonmetallic stabilizer and detergent additives should be maintained. By 1980, gasolines should contain no more than 0.2 ml/l of tetraethyl lead and below 15% alkenes; to reduce evaporation-caused hydrocarbon pollution, gasolines should exhibit a below 100 ton vapor pressure. The temperature providing a 10% fuel evaporation should be decreased from 70 to 50 C.

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and gasolines should have a 90 octane figure. A review discussing the factors involved in fuel-generated pollution involving the structure of the constituent hydrocarbons, their carbon/hydrogen ratio, and the explosion resistance of gasolines is included.

27383

APTIC NO. 49609

Verrelli, Leonard D. and Casimer J. Andary

EXHAUST EMISSION ANALYSIS OF THE WILLIAMS RESEARCH GAS TURBINE AMC HORNET. *Office of Air Programs, Test and Evaluation Branch, Rept. 72-27, APTD-1410, 13p., May 1972. 1 ref.*

The exhaust emission characteristics of an automobile equipped with a gas turbine were studied to determine the effects of the regenerative turbine system on driveability and emissions of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. By positioning the power turbine bypass in the closed position, low hydrocarbon emissions were effected; however, CO and NOx were not reduced sufficiently to meet the 1975-1976 emission standards. Limited testing of driveability determined slower than normal accelerations, limited engine retardation, and a maximum speed of about 78 mph.

27384

APTIC NO. 49455

Wang, Tseng Cheng

BIOEFFLUENT STUDY OF HUMAN OCCUPANCY IN ENCLOSED SPACE. *Iowa Univ., Iowa City, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., May 1972, 86p. 21 refs.*

Bioeffluents of human occupancy were studied in a test facility, a self-contained auditorium with 434 seats and a total volume of 90,000 cu ft. The air conditioning system installed provides the usual facilities for partial air recirculation and fresh air intake control. The bioeffluents analyzed contained acetone, acetaldehyde, allyl alcohol, ammonia, amyl alcohol, butyric acid, carbon dioxide, carbon monoxide, diethyl ketone, ethyl alcohol, ethyl acetate, hydrogen sulfide, methyl alcohol, phenol, and toluene. Carbon dioxide was the most abundant compound in the inorganic bioeffluent. Methanol, ethanol, and acetone were considerably higher than the other organic compounds. Dietary sources and physiological conditions may strongly affect bioeffluent production. The amount of individual compounds during normal lectures varied with different times of day and probably somewhat from day to day. Carbon dioxide production was 45% higher in examination periods. Higher metabolism rates in examination conditions were inferred. Higher methanol production rate was found in mostly male classes. It was the only sex differentiation. Sampling and analysis methods are mentioned.

1971

27385

APTIC NO. 49856

Mechanical Technology Inc.; Bendix Corp., Detroit, Mich., Research Labs. Div., and Ford Motor Co., Detroit, Mich.

FEASIBILITY ANALYSIS OF THE TRANSMISSION FOR A FLYWHEEL/HEAT ENGINE HYBRID PROPULSION SYSTEM. *Office of Air Programs Contract 68-04-0033, APTD-1181, MTI-71TR75, 238p., Nov. 1971. 7 refs.*

NTIS: PB 212097

The practicality of a transmission that would meet the requirements of a flywheel/heat engine hybrid propulsion system for a family car was quantitatively assessed from both a performance and cost viewpoint. The scope of the study included: consideration of various types of feasible transmissions; selection of a candidate transmission; detailed performance and controls analysis of the candidate transmission; and a detailed cost analysis of the transmission. Cost analysis showed that

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the flywheel/hybrid propulsion system would cost over 125% more than the present day automatic transmission for production quantities of 1,000,000 units/yr. On a variable cost basis, the increase in cost would be 140%. Performance analysis showed that the efficiency of the transmission was higher than a conventional automatic transmission at cruise power and lower at maximum power conditions. Fuel consumption of the flywheel/ hybrid system was higher than a conventional system at idle and low-speed cruise power conditions. A description of the hybrid system design, of the controls, and safety and operational aspects is also given.

27386

APTIC NO. 49625

Ashby, H. Anthony

EXHAUST EMISSIONS FROM TWO GENERAL MOTORS STEAM CARS. *Office of Air Programs, Research Triangle Park, N. C., Bureau of Mobile Source Pollution Control, Rept. 71-29, APTD-1414, 11p., May 1971.*

The exhaust emission characteristics of two cars powered by Rankine cycle powerplants were studied to determine the effect of the alternate systems on fuel consumption and emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. The 1975 emission standards were not met by either vehicle. Emissions of HC and CO were lower, NOx emissions were higher, and fuel consumption decreased at hot start than warm-up was included. Fuel consumption for both cars was unacceptable by contemporary standards.

27387

APTIC NO. 49464

Duffy, T. E., J. R. Shekleton, R. T. LeCren, and W. A. Compton

LOW EMISSION BURNER FOR RANKINE CYCLE ENGINES FOR AUTOMOBILES. (FINAL REPORT). *International Harvester Co., San Diego, Calif., Solar Div., Air Pollution Control Office Contract EHS 70-106, APTD 0707, RDR 1695, 173p., 1971.*

NTIS: PB 202196

Modern analytical and experimental techniques were applied to the design, fabrication, development, and demonstration of a low emission combustor system for an automotive Rankine cycle engine. Studies were made to determine whether a Rankine cycle combustor with a two million Btu/hr heat release in a 1.33 cu ft volume operating on JP-5 fuel could meet the 1980 emission levels for hydrocarbons, carbon monoxide, particulates, and nitric oxide set by the Advanced Automotive Power Systems (AAPS), over a 100 to 1 heat release range at steady state or during rapid transients. The transients included startup to full power in 3 sec and a 50% power rate change/sec. A new fuel atomization and precise air-fuel ratio control concept was applied to the combustor system. A fully modulated system incorporating a rotating cup fuel atomization system and all necessary controls to supply and regulate both fuel and air at high response rates while maintaining the optimum air-fuel ratio for lowest emissions was developed. System designs, component tests, and transient response emissions tests are described. An emissions analysis was also made by computer modelling. The 1980 emission levels can be met; the components used in the Rankine engine are reliable and can be mass produced at low cost; the fuel atomization system assures that fuels can be rapidly ignited (even in the coldest weather) and do not need warm up to maintain low emissions as do the current spark ignition engines; fuels need no special additives; and the novel rotating cup and the precision air and fuel metering valves and controls are essential to maintain low emissions over the 100 to 1 heat release range. Fan and combustor noise are problems to be investigated in the future.

27388

APTIC NO. 49882

Foerg, Wolfgang and Volkner Etzbach

NATURAL GAS LIQUEFACTION. (*Erdgasverflüssigung*). *Text in German. Chem.-Ing.-Tech., 43(17):979-981, Sept.*

EMISSION SOURCES

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1971. (Presented at the Meeting of the Thermal Separation of Gaseous Mixtures Professional Group of the Technological Society, Bensheim Auerbach, West Germany, May 21 and 22, 1970.)

A natural gas liquefaction plant using liquid fractions (nitrogen, methane, propane, butane, and pentane) separated during liquefaction for the cooling of the natural gas at various stages is described. A single compressor, for capacities of up to 5000 N cu m/hr, is used for the cooling system. The natural gas arriving under a pressure of about 40 bar and at a maximum temperature of 308 K is, instead of being dried, mixed with methanol intended to inhibit the separation of hydrates. A liquid fraction composed of water, odorants, and some heavy hydrocarbons dissolved in methanol is separated before washing with methanol for the absorption of carbon dioxide and odorants. While passing through the consecutive stages, the natural gas is successively expanded to about 5 bar and cooled to 110 K. The liquefied natural gas is stored at the above temperature and under 200-500 kg/sq m pressure, and when needed, is evaporated by warming up to about 280 K by means of 2% of the evaporated natural gas. The methanol used in the process is sent to a stripping column for regeneration and recycling. Such liquefying plants can be built for capacities of 3000 to 20,000 N cu m/hr, and the evaporator capacities may range from 50,000 to 500,000 N cu m/hr.

27389

APTIC NO. 49903

Froehling, Werner

PROBLEMS OF ENVIRONMENTAL PROTECTION - THEIR SCOPE AND SIGNIFICANCE. (*Probleme des Umweltschutzes - Umfang und Bedeutung*). Text in German. Kernforschungsanlage Juelich (West Germany), Inst. fuer Reaktorentwicklung, 27p., June 1971. 23 refs.

NTIS: JUL-779-RG

General problems of air and water pollution, contamination by pesticides, waste disposal, and nuclear power plants are reviewed. Correlation between air pollutant levels and the incidence of respiratory diseases such as bronchitis and lung cancer has been established. Sulfur dioxide, increasing considerably the incidence of chronic bronchitis when present in concentrations above 0.04 ppm, may cause acidification of soil and water, and damage vegetation. Nitrogen oxides are essential for smog formation, and also may contribute to the eutrophication of waters when washed out in the form of nitrates. Carbon dioxide and dust, both emitted in ever-increasing amounts, are believed to have opposite effects globally. The removal of lead from gasoline with octane rating unchanged will require the addition of possibly carcinogenic aromatics, and reduced octane rating will necessitate increased stroke volume and reduced compression ratio. Nuclear power plants, emitting 1-10 ppm of radioactive isotopes, are and will be constituting no environmental hazards. Reprocessing facilities have, however, much higher leakage rates of up to 3000 ppm. The environmental tritium load in the year 2000 will be well below 0.001 mrem, while the crypton load is expected to rise to 1-5 mrem/yr.

27390

APTIC NO. 49878

Gross, George P.

GASOLINE COMPOSITION AND VEHICLE EXHAUST GAS POLYNUCLEAR AROMATIC CONTENT. Esso Research and Engineering Co., Linden, N. J., Products Research Div., National Air Pollution Control Administration Contract CPA-22-69-56, Coordinating Research Council APRAC Proj. CAPE-6-68, Annual Rept. CRC-APRAC-CAPE-6-68-1, 124p., April 1971. 18 refs.

NTIS: PB 200266

Variables affecting vehicle exhaust emission of phenols and polynuclear aromatic hydrocarbons (PNA) (such as benzo(a)pyrene (BaP) and benz(a)anthracene (BaA)) were examined in cyclic tests on a chassis dynamometer, using a 1966

V-8 passenger vehicle without emission controls and a 1968 vehicle with engine modification controls. The total exhaust, except a sidestream for infrared gas analysis, was cooled, the condensate collected, and the cooled gas filtered in equipment which avoided exhaust back-pressure effects in all driving modes. Each test consisted of 36 Federal seven-mode test cycles in three 12-cycle blocks, with the engine cooled between blocks, resulting in a 2/1 ratio of hot/warmup cycles and ensuring comparability to the standard weighted emissions-test results. Material removed from the muffler, tailpipe, and collector systems was analyzed for BaP and BaA by chromatography and isotopic dilution and for phenols by differential ultraviolet absorbance. Fuel aromaticity, volatility, PNA content, and tetraethyl lead content variables were also studied. Emission rates/gal fuel ranged from 116-689 mg phenols, 26-149 micrograms BaP, and 54-303 micrograms BaA. Phenol emission from the vehicle with engine modifications was not significantly lower than from the non modified vehicle when using high-aromatic fuels (46%) but was 8-30% lower with 12% aromatic fuels. The 1968 engine-modified vehicle emitted only 20-40% as much PNA as the 1966 unmodified vehicle. Increasing fuel aromaticity from 12-46% increased PNA by 36-74% in the 1966 vehicle, but only 8-34% in the modified vehicle. Increasing PNA content of gasoline from near 0 to the field maximum increased PNA emission by 15-30% in either test vehicle and in both low- and high-aromatic fuels. Changes in combustion-chamber deposits also required adjustment for concurrent changes in CO emission. Lead-free deposits did not cause PNA emissions to differ significantly from those from a clean engine. The combined effect of adding lead to both deposits and fuels was an increase of 95% in BaP emission and 120% in BaA emission. (Author summary modified)

27391

APTIC NO. 49962

Koehnlein, W.

LIQUEFIED PETROLEUM GAS. PROPERTIES, SUPPLY FACILITIES, ECONOMY. (*Fluessiggas. Eigenschaften, Versorgungseinrichtungen, Wirtschaftlichkeit*). Text in German. Oel Gasfeuerung, 16(1):26, 28, 30, 32-34, Jan. 1971.

Uses, properties of, and supply facilities for liquefied petroleum gas, a by-product obtained in the refining of petroleum, are described. Liquefied petroleum gas has become too competitive to remain a relief fuel for natural gas any longer. The consumption has doubled during the last 6 years in West Germany. Liquefied petroleum gas contains a maximum of 0.005% sulfur, small quantities of oil and resin residues, but no water, lye, or toxic components. Thus, it is a highly attractive fuel from an environmental point of view. Liquefied petroleum gas is increasingly used as a motor fuel, especially in material handling and other indoor equipment due to the very small carbon monoxide emission.

27392

APTIC NO. 49739

Rossini, Frederick D., Philip Myers, Bruce Bailey, S. L. Meisel, G. J. Stopps, A. L. Aronson, Gary Ter Haar, Bruce H. Simpson, and A. F. Forziati

PANEL DISCUSSION. SCIENCE AND THE ENVIRONMENT (I) - LEAD IN GASOLINE. J. Wash. Acad. Sci., 61(2):138-147, June 1971.

Environmental and health effects of lead in gasoline, and technological possibilities to remove leaded particulate matter from automotive exhaust and to produce unleaded gasoline are discussed. The adequacy of the seven-cycle test for testing lead emissions is challenged. Nitrogen oxide catalysts presently available for leaded and unleaded gasoline have a maximum life of 5000 to 10,000 miles, which makes exhaust gas recirculation instead of catalysis for emission control in the near future more probable. It would be possible without considerable difficulty to increase the octane rating of gasolines from the present 88-88.5 to 91, while a further increase, necessary for the use of unleaded gasoline, would require huge investments. Automotive standards including lead

27393

and emissions standards should be set that are practically attainable within a given span of time in a sensible, practical way, and also hard penalties should be established for those who do not meet the minimum standards.

27393

APTIC NO. 49738

Stoiber, Richard E., Daniel C. Leggett, Thomas F. Jenkins, Richard P. Murrmann, and William I. Rose

ORGANIC COMPOUNDS IN VOLCANIC GAS FROM SANTIAGUITO VOLCANO, GUATEMALA. *Geol. Soc. Amer. Bull.*, vol. 82:2299-2302, Aug. 1971. 7 refs.

Gas samples collected at Sapper fumarole of the Santiaguito, Guatemala, volcano on Dec. 5, 1969, were analyzed by gas chromatography-mass spectrometry. The samples were composed of 95% air, presumably of atmospheric origin, water vapor, and both organic and inorganic gases. The total organic content was about 100 ppm, and the methane content was fairly high (14 ppm). The compounds identified in the gas samples were methane, xenon, nitrogen dioxide, ethylene, tetrafluoroethylene, ethane, carbonyl sulfide, hexafluoropropene, propene, propane, chlorodifluoromethane, chlorotrifluoroethylene, chloromethane, methanol, acetaldehyde, methanol, isobutene, butene, dichlorofluoromethane, ethanol, carbon disulfide, isopentene, propanol, acetone, trichlorofluoromethane, pentane, isopropanol, methyl acrolein, n-propanol, methylethyl ketone, hexenes, hexanes, benzene, cyclohexane, trichloroethylene, heptenes, methyl cyclohexane, toluene, octenes, octanes, 1,1,2-trichloro-1,2,2-trifluoroethane, hydrochloric acid, and hydrofluoric acid. The compounds are probably produced by heating of fossil soil or sedimentary layers by the magma.

27394

APTIC NO. 49679

Thomson, John C.

A REPORT ON THE EXHAUST EMISSIONS OF THE 1971 PRODUCTION VERSION OF THE ARMY M-151 JEEP. *Office of Air Programs, Research Triangle Park, N. C., Bureau of Mobile Source Pollution Control, Rept. 71-27, APTD-1416, 5p., April 1971.*

The exhaust emission characteristics of an Army jeep were studied with respect to emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides and evaporative emission losses. The emission levels of the M-151 were quite high when compared to controlled production automobiles. Evaporative emission levels were also higher than the current standards.

27395

APTIC NO. 49687

Thomson, John C.

EXHAUST EMISSIONS FROM A REACTOR EQUIPPED, FULL-SIZED AUTOMOBILE USING LPG FUEL. *Air Pollution Control Office Div. of Emission Control Technology, Rept. 71-21, APTD-1422, 5p., March 1971.*

The exhaust emission characteristics of a car equipped with a reactor, exhaust gas recirculation, pulse air injection, and a liquefied petroleum gas conversion system were studied to determine the effects of these modifications on emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. The hydrocarbon values were consistently higher than the proposed 1975 standards, while CO values were lower than the standard. The NOx emission levels were also low.

27396

APTIC NO. 49801

Thomson, John C.

A REPORT ON THE EMISSION PERFORMANCE OF THE ARMY SPONSORED FORD STRATIFIED CHARGE ENGINE. *Air Pollution Control Office, Div. of Emission Control Technology, Rept. 71-23, APTD-1420, 9p., April 1971.*

AIR POLLUTION ABSTRACTS, JUNE 1973

The exhaust emission characteristics of a stratified charge engine were studied to determine the effect of the modified engine design on driveability, fuel economy, and emissions of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The system established its potential for meeting the 1976 emission standards while maintaining the driveability and fuel economy of the uncontrolled vehicle.

27397

APTIC NO. 49626

Verrelli, Leonard D.

EXHAUST EMISSION ANALYSIS OF THE WILLIAMS RESEARCH GAS TURBINE VOLKSWAGEN. *Office of Air Programs, Research Triangle Park, N. C., Bureau of Mobile Source Pollution Control, Rept. 71-30, APTD-1413, 6p., May 1971.*

The exhaust emission characteristics of a regenerative turbine automotive engine powered by non-leaded gas were studied to determine the effects of the modified system on engine performance and emissions of carbon monoxide, carbon dioxide, nitric oxide, nitrogen dioxide, and hydrocarbons. The test vehicle did meet the 1975 standards, but the results were not consistent throughout the test series. The driveability did not compare to a conventional internal combustion engine vehicle.

27398

APTIC NO. 49446

Walter, R. A., A. J. Broderick, J. C. Sturm, and E. C. Klaubert

USCG POLLUTION ABATEMENT PROGRAM: A PRELIMINARY STUDY OF VESSEL AND BOAT EXHAUST EMISSIONS. *Dept. of Transportation, Cambridge, Mass., Transportation Systems Center, Contract CG 207, Work Unit R-2002, TR-DOT-TSC-USCG-72-3, 129p., Nov. 30, 1971. 52 refs.*

Exhaust emissions from the Coast Guard fleet were measured in a preliminary study to determine their contribution to air pollution relative to other transport sources. Legislative guidelines, including emission standards for smokes, particulates, sulfur oxides, nitrogen oxides, hydrocarbons, and carbon monoxide, were reviewed to provide the context for the abatement program. Data on the classification and fuel usage of vessels and boats, vessel exhaust emission levels, instrumentation and measurement techniques, and emission control technology are examined. Based on a preliminary analysis, the Coast Guard is an insignificant source of air pollutant emissions due to the small number of vessels. The potential for increased emissions, depending on fleet increase or certain operating conditions, does exist and must be considered.

1970

27399

APTIC NO. 49735

Fairey, F. Strait and John W. Gray, III

SOIL LEAD AND PEDIATRIC LEAD POISONING IN CHARLESTON, S. C. *J. S. Carolina Med. Assoc.*, 1970:79-82, March 1970. 6 refs.

One hundred seventy random soil samples collected throughout the city of Charleston, S. C., including 37 samples from houses where pediatric lead poisonings occurred, were analyzed by atomic absorption spectrophotometry. More than 75% of all samples contained less than 500 ppm lead, while the lead contents in another 30 samples, mostly those collected from sites where pediatric lead poisoning had occurred, exceeded 1000 ppm. Such lead levels in the soil are regarded as sufficient to cause chronic pediatric lead poisoning when ingested. No increased lead level was found in samples taken near roads as compared to those near yards. The organic lead content of the soil samples due to automotive exhaust was below 10 ppm. The likely sources of inorganic lead in the soil are paint and ashes.

EMISSION SOURCES

27406

27400

APTIC NO. 49691

Gompf, Henry L.

EXHAUST EMISSIONS FROM 10 GSA REBELS AND 10 GSA FALCONS EQUIPPED WITH LPG CONVERSION KITS. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-10, APTD-1432, 12p., Oct. 1970.*

The exhaust emission characteristics of 20 cars equipped with liquefied petroleum gas kits were studied to determine the effect of the kits on performance and on emissions of carbon monoxide, hydrocarbons, and nitrogen oxides. The LPG conversion kits gave overall average emission levels of 0.60 g/mi hydrocarbons, 2.83 g/mi CO, and 2.86 g/mi NOx. Twelve of the cars tested surpassed the 1973 federal standards, but only three cars met the proposed 1975 standards. None of the cars could meet the stringent NOx standard proposed for 1976. The cars powered by the LPG kit emitted a distinctive odor. The driveability of the vehicles was also appreciably damaged.

27401

APTIC NO. 49695

Gompf, Henry L.

EXHAUST EMISSIONS FROM A PASSENGER CAR POWERED BY MARVEL-SCHLEBLER LPG CONVERSION. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-8, APTD-1434, 4p., Sept. 1970.*

The exhaust emission characteristics of a passenger car equipped with a liquid petroleum gas system and a decel device which held the throttle partially open during deceleration were measured to determine the effect of the system on emissions of hydrocarbons, carbon monoxide, and nitrogen oxides. The car powered by the system with and without the decel device met or surpassed the 1972 Federal emission standards. With the decel device removed, however, hydrocarbon content increased about 20% although it did not exceed the standards.

27402

APTIC NO. 49736

Kirby, George F. and F. D. Gottwald

LEAD AND AIR POLLUTION: AN ANALYSIS OF THE MORSE REPORT. *Ethyl Corp., 12p., Aug. 1970. 12 refs.*

The Morse Report recommendation suggesting governmental restrictions on lead antiknocks in gasoline are refuted by Ethyl Corp. as unjustified on the basis of existing data and evidence, as unsound in the light of admitted economic and social costs, and as not contributing appreciably to a solution of the general air pollution problem. Total lead in the general atmosphere from all sources does not constitute a health hazard, and lead discharged from automobile exhausts does not contribute to photochemical smog. A recent survey of three urban communities, coupled with other findings, showed no significant increase in lead concentrations in urban air over the past 5 years. Comprehensive medical studies have shown no increase in the blood lead levels of the population over the past 20 years or more, despite the increase in lead antiknock use and in the automobile population. Notwithstanding, further medical research should be conducted into the possible health hazards at some future date resulting from the use of leaded gasoline. A number of catalytic exhaust devices, including one developed by Ethyl Corporation, worked well with leaded gasoline and met the California Motor Vehicle Pollution Control Board requirements.

27403

APTIC NO. 49881

Rossi, B. D. and V. A. Usachev

QUANTITATIVE DETERMINATION OF NOXIOUS GASES FORMED DURING THE EXPLOSIVE CONVERSION OF EXPLOSIVES UNDER LABORATORY CONDITIONS. In: *Control of Noxious Gases in Blasting Work, and New Methods of Testing Industrial Explosives*

(*Borba s yadovitymi gazami pri vzryvnykh rabotakh i novye metody ispytaniy promyshlennykh VV*). *Vzryvnoe Delo*, no. 68/25, 1970. Translated from Russian. *Israel Program for Scientific Translations, Jerusalem, p. 57-59, 1971.*

The composition and quantity of noxious gases during blasting with different explosives in various rocks can be estimated by determining the composition of a crushed rock sample in a Dolgov cylinder and determining concentrations of carbon monoxide, nitrogen oxides, and other combustion products of the explosion. The mathematical determination of the volume of gaseous explosion products, taking into consideration pressure and temperature, is described.

27404

APTIC NO. 49628

Thomson, John C.

AN EVALUATION OF THE EXHAUST EMISSIONS FROM TWO VEHICLES EQUIPPED WITH COMPRESSED NATURAL GAS CONVERSION KITS. *Air Pollution Control Office, Div. of Motor Vehicle Research and Development, Rept. 71-17, APTD-1425, 5p., Dec. 1970.*

The exhaust emission characteristics of vehicles equipped with dual fuel conversion systems were studied to determine the effect of compressed natural gas as fuel on emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. The levels of emission measured were below the 1972 standards but exceeded the proposed 1975 standards.

1969

27405

APTIC NO. 49725

Benson, Carl S.

THE ROLE OF AIR POLLUTION IN ARCTIC PLANNING AND DEVELOPMENT. *Polar Rec.*, 14(93):783-790, 1969. 18 refs.

The role of air pollution in arctic planning and development is discussed. Low temperatures combined with strong surface inversions in wind-sheltered lowlands in the arctic areas produce exceptionally stable air masses which are easily polluted. Also the presence of the impermeable permafrost layer over much of the Arctic prevents the dispersal of man's waste products and facilitates pollution of water and land. Ice fog is low-temperature air pollution, occurring whenever cold air (minus 35 deg C or below) is calm and accompanied by a continuing source of water vapor. Sources of air pollution in Fairbanks, and the pollutant interaction with the atmosphere are reviewed. Conditions in Fairbanks are compared with those in Los Angeles for perspective. Water vapor is the greatest pollutant, contributing to the ice fog. Its sources are combustion products, power plant cooling waters, and commercial and domestic sources. Carbon dioxide, sulfur dioxide, lead in salts, and bromine and chlorine in salts are other pollutants found in the air. The future planning and development of communities in the Arctic regions must take into account the atmospheric environment in order to avoid the pollution problems of Fairbanks.

27406

APTIC NO. 49861

Feely, F. Joseph, III

AIR POLLUTION REPORT -- FEDERAL FACILITIES. METROPOLITAN ST. LOUIS INTERSTATE AIR QUALITY CONTROL REGION. *National Air Pollution Control Administration, Federal Facilities Branch, APTD-0985, 36p., July 1969. 6 refs.*

NTIS: PB 209715

The Metropolitan St. Louis Interstate Air Quality Control Region includes counties in Illinois and Missouri. Data were gathered on the Federal facilities within the area to determine fuel burning and refuse disposal practices, fuel usage by type and amount, emissions of air pollutants, and abatement plans.

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Complete data on refuse disposal through open burning or incineration, annual combustion of natural gas, distillate oil, residual oil, and coal, and emissions of sulfur oxides, nitrogen oxides, carbon monoxide, particulates, and hydrocarbons are presented. Federal facilities in the area contribute 2700 tons SOx, 850 tons NOx, 4100 tons CO, 650 tons of particulates, and 690 tons of hydrocarbons annually.

1966

27407

APTC NO. 49483

Randall, Clifford Wendell

BACTERIAL AIR POLLUTION FROM ACTIVATED SLUDGE UNITS - FIELD AND TRACER STUDIES. Texas Univ., Coll. of Engineering, Austin, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Jan. 1966, 123p. 92 refs.

The question of the potentiality for the spread of airborne infection by activated sludge sewage treatment was studied. The bacterial population of the air was significantly increased by passage over an activated sludge treatment unit. Despite a rapid die-off of the bacteria, particularly during the first 3 seconds they are airborne, the increase in the bacterial population persists for a considerable time and distance, the latter being strongly dependent on the wind velocity. Large numbers of bacteria of the family Enterobacteriaceae, including species of proven pathogenicity, are emitted from activated sludge units. The respiratory pathogens occurred much more frequently than the enteric pathogens. Of the pathogenic bacteria demonstrated, those with the greatest pathogenic potential in the respiratory tract not only occurred most frequently but were also most resistant to the effects of dehydration and persisted in the atmosphere for the longest time. The most significant pathogens demonstrated, the Klebsiella species, occurred in large numbers in the aerosol emissions from both raw sewage and activated sludge. They represented about 6% of the total activated sludge bacterial emissions. Neither Salmonella nor Shigella species could be found in the activated sludge or raw sewage emissions. A considerable portion of the bacteria were associated with a particle size of 5 micron or less, a size that permits lung penetration. The number of bacteria emitted from an activated sludge unit varies with the growth phase of the microbial system. The results indicate a definite possibility of airborne infection from activated sludge units.

1958

27408

APTC NO. 49829

Gottenberg, William George

REACTION RATE AND SURFACE AREA EFFECTS ON THE HYDROCARBON CONTENT OF THE COMBUSTION PRODUCTS OF SPARK IGNITION ENGINES. Yale Univ., New Haven, Conn., Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1958, 86p. 24 refs.

The effect of flame speed as varied by changing mixture dilution on the hydrocarbon content of combustion products of spark ignition engines was studied. An increase in the quench distance resulted in an increase in the unburned hydrocarbons, which was verified by actually measuring the quench distance changes. Discovery of the fact that the unburned hydrocarbons increased linearly with an increase in the surface area of the combustion chamber gave further support to the wall quench theory. For these experiments, a special apparatus was used which allowed the initial temperature, pressure, and mixture strength to be closely controlled and which permitted the turbulence, mixture, dilution, and combustion chamber surface area to be easily regulated. The quench distance was inversely related to the reaction rate. Decreasing the turbulence of the air-fuel mixture slowed down the rate of reaction, which in

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turn increased the concentration of the unburned hydrocarbons.

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1973

27409

APTC NO. 49095

THE INCINERATOR BERLIN-RUHLEBEN. DESIGN-ORGANIZATION AND EXPERIENCE. (Müllverbrennungswerk Berlin-Ruhleben. Aufbau, Organisation und Erfahrungen). Text in German. *Städtehygiene (Uelzen/Hamburg)*, 24(2):36-40, 1973.

The incinerator plant in Berlin-Ruhleben which began operation in 1967, comprises the actual incinerator with eight firing and boiler units for the combustion of domestic refuse, bulky refuse, rubbish, and industrial refuse, as well as for the production of high-pressure hot steam. It also comprises a slag processing station for preliminary treatment of combustion residues and a sintering plant for the production of sinter pumice from the combustion residues. Light-fuel oil-fired auxiliary burners begin to operate when the combustion chamber temperature drops below 900 C and at the start. The flue gases from the incineration leave the combustion chamber with a temperature of 900 to 1000 C and are cooled in the steam generator to 220 C. Part of the dust load is removed at this stage. At the end of the steam generator the flue gases are cleaned in an electrostatic precipitator whose collection efficiency is higher than 99.5%. The flue gases are eventually released via a blower and a 76 m stack. The heat liberated during incineration is supplied to the neighboring power plant in the form of high-pressure hot steam. The preliminarily treated slag (comminuted) along with the fly ash collected in the steam generator and the fly dust from the electrostatic precipitators is subjected to a high-temperature fast melting process. The air drawn through the sintering layer of 20 to 30 cm depth is cleaned in an electrostatic precipitator and discharged through the stack.

27410

APTC NO. 49221

DIESEL SMOKE LIMITER FOR FIAT ENGINES. (Diesel-Rauchbegrenzer fuer Fiat-Motoren). Text in German. *Motortech. Z. (Stuttgart)*, 34(2):59-60, 1973.

The new Fiat smoke regulator for heavy trucks prevents too high exhaust gas temperatures and bad mixing ratios which would lead to increased smoke development. In altitudes above 800 m the regulator reduces the fuel quantity in accordance with the rising exhaust gas temperature. The regulator can be installed in already operating trucks on the supply side of the injection pump. It comprises a thermocouple in the exhaust pipe, electronic switching device with a regulating valve, a three-way magnetic valve for controlling the compressed air mechanism which changes the fuel quantity supplied to the injection pump, and the compressed air mechanism itself. The thermocouple reports to the magnetic valve any temperature drop below or rise above a lower or upper temperature limit.

27411

APTC NO. 49988

Ando, Junpei

TECHNICAL PROBLEMS AND ECONOMICS OF SMOKE DESULFURIZATION. (Haiei datsuryu no gijutsuteki mondaiten to keizaisei). Text in Japanese. *PPM (Japan)*, 4(1):31-39, Jan. 1973, 12 refs.

The target year to achieve sulfur dioxide environmental standards is to be 1975, advanced from 1978. Heavy oil desulfurization capacity in Japan as of March 1971 was at the 1 million kW level, which is expected to be 4.3 million in 1975, treating 6 million kl of heavy oil a year. If heavy oil of 3% sul-

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fu content is to be used and 90% of the SO₂ is to be recovered in 1975, SO₂ recovered would reach about 310,000 tons, or in terms of sulfuric acid, 480,000 tons, or in terms of gypsum, about 830,000 tons. Production of sulfuric acid would reach 8.4 tons, exceeding its demand of 7.4 tons in 1975. Daily desulfurization of heavy oil by the direct method at present is 180,000 barrels and by the indirect method is 480,000 barrels, which will be 380,000 and 660,000 barrels, respectively, in 1975. Only one company is allowed to produce sulfuric acid from recovered sulfur. Sulfuric acid will be utilized in producing gypsum, ammonia sulfate, and Glauber's salt. From gypsum, calcium sulfite and plastics can be made. Although sulfur can be utilized for road construction, there will be too much sulfur and its compounds. Desulfurization costs at present by wet methods at a 90% desulfurization rate are \$420-600/k, for a plant of about 200,000 N cu m/h. Only 25-30% of the heavy oil will be desulfurized by desulfurization of heavy oil and stack smoke; and further desulfurization including gasification desulfurization will be required. Power companies should desulfurize smoke, and smaller consumers should use low sulfur oil.

27412

APTIC NO. 49763

Bauhans, D.

COMMERCIAL STONE-CRUSHING PLANT FOR PROCESSING DIABASE FEATURING COMPLETE DUST COLLECTION. (*Vollentstaubtes Schotterwerk fuer die Diabas-Aufbereitung*). Text in German. *Aufbereitungs-Technik*, 13(2):104-107, 1973.

A stone-crushing plant is described which processes 1500 t/day. The products of the plant include six different fractions ranging from 55/35 to 0/3. The crushed stone can be discharged separately from the silos into trucks or can be mixed after having passed silo discharge conveyors and be stockpiled. The dust collectors remove dust produced at 24 transfer points. The filtering system comprises six round filter cells each with 30 tubular filter bags made of polyester fiber. The filter bags are cleaned by reverse air jet cleaning with fresh air and by simultaneous mechanical rapping. The automatically cleaned bag filters have a filter area of 460 sq m, and their suction rate is 60,000 cu m/hr. The collected dust can be used as a filler material.

27413

APTIC NO. 49771

Breidenbach, Dieter

FIRST RESULTS OF NEW PROJECTS FOR THE REDUCTION OF DUST EMISSIONS AT THE COKE PRESSING PROCESS. (*Erste Ergebnisse neuer Verfahren zur Verringerung von Staubemissionen beim Koksdruucken*). Text in German. *Glueckauf* (Essen), 109(3):219-223, Feb. 1, 1973.

The only emission problem which still must be solved in coking plants is the dust emission during the pressing of coke into the quenching wagons. Three methods are in operation to stem these emissions, the spraying of coke with water, the complete encapsulation of the quenching wagon tracks and exhaust hood installed over the quenching wagon. The spraying of coke is the least expensive method. For each pressing process, 300 to 500 l of water are needed. The water evaporates instantly. The rising steam cloud wets the rising coke dust. This method reduces the dust emission in the neighborhood of the plant but not on the plant premises itself. The second method uses corrugated sheet steel for enclosing the quenching area. Two radial blowers in the center of the roof, each with a capacity of 60,000/cu m/hr and draw off the emissions. Water is injected into the exhaust pipes of the blower. The collection efficiency of these separators is 90% over long-term operation. The dust concentration could be reduced to 150/mg/cu m air. A new mobile exhaust hood installed above the entire length of the quenching wagon is described as third method of reducing the dust emissions. It comprises eight rotovent dust collectors which produce the necessary exhaust capacity by ejecting

steam of 8 g force/sq cm from an annular nozzle. Water is injected into the steam-flue gas-mixture and mixed with it. A rotary movement is imparted which throws the water and dust to the wall of the dust collector. Each dust collector draws off 120,000/cu m/hr.

27414

APTIC NO. 49257

Charkabortty, Saghana and Helen E. Grenga

ADSORPTION OF CARBON MONOXIDE ON RUTHENIUM. *J. Appl. Phys.*, 44(1):500-501, Jan. 1973, 10 refs.

Field-ion and emission microscopy techniques were used to study the adsorption and desorption of carbon monoxide on (1011), (1010), (1122), and (2021) regions of ruthenium. Both physisorbed CO and beta-C were found on all regions, while alpha-CO was found only on low-index (1011) and (1010) regions. Substrate and/or adsorbate rearrangements also occurred on all regions. While the M-CO bond energy was less on ruthenium than that reported for tungsten, the ratio of the M-CO to M-M bond energy was greater in the case of ruthenium. Ruthenium can be used as a catalyst for the decomposition of CO.

27415

APTIC NO. 49160

Cook, C. Sharp

ENERGY: PLANNING FOR THE FUTURE. *Am Scientist*, 61(1):61-65, Jan./Feb. 1973, 40 refs.

According to one estimate, the demand for fossil fuel will exceed the supply after 1980. Meeting future energy demand will involve not only a search for more fuel supplies or different sources of energy, but also the consideration of such problems as pollution, priorities, efficiency and economics. Increased use of fossil fuels has increased air pollution by toxic metallic atoms, particulates, gaseous hydrocarbons, ozone, and carbon, sulfur, and nitrogen oxides. Even nuclear plants are not free of pollution problems, the most serious being the disposal of radioactive wastes that accumulate inside reactors. Underground burial of the wastes in salt beds or silicate rock has been proposed. Greater reliance on cooling towers is an answer to the problems of thermal pollution caused by nuclear plants and fossil fuel burning. A priorities question that has reached the controversial stage involves the conflict between the need for additional dams to provide electric power and the need for wilderness areas. More efficient use of energy resources is possible through use of improved insulating material, use of materials that require low energy input for their production, methane production from organic waste products, fuel cells, and magnetohydrodynamic techniques. Future energy costs are going to be much higher as easily accessible fuel sources are depleted. The reduction of pollution is also costly; a plausible annual cost to the Tennessee Valley Authority system to meet existing and planned requirements for environmental protection is \$600 million. Nuclear energy may become a much more important source of electricity in the next few decades. Other energy sources are not available in sufficient quantity to replace fossil fuel and will require without large expenditures of money on research and development.

27416

APTIC NO. 49410

Elenkov, D. and G. Grozev

INCREASE OF THE ADSORPTION CAPACITY OF A XYLITE LOW-TEMPERATURE COKE FOR SULFUR DIOXIDE BY THE ADDITION OF ACTIVATING AGENTS. (*Steigerung des Adsorptionsvermoegens eines Xylitschwefelkokes gegenueber Schwefeldioxyd durch aktivierende Zusatze*). Text in German. *Wasser, Luft, Betrieb*, 17(1):15-19, 1973, 10 refs.

The influence of copper, molybdenum, manganese, vanadium, and cobalt on the adsorption capacity of xylite low-temperature coke (750 C) with grain sizes between 3 and 6 mm was tested at a temperature of 70 C and a gas residence time of 5 s.

sec. The gas used for the tests contained 0.5% by volume sulfur dioxide, 8% by volume oxygen, 10.2 g/cu m water vapor, and the remaining percentage nitrogen. The concentration of the metal ion added to the coke was constantly kept at 2% by mass. In order to reduce the number of experiments, factor analysis was used. For determination of the optimum conditions between the concentrations of the activating additives, the gradient method was used which was explained elsewhere. Xylite low-temperature coke activated with 2.50 mass percent Cu, 2.25 mass percent V, and 3.50 mass percent Co produced the best results. With activated coal made from waste lignin these additives did not bring as good results which indicates that the influence of the additives is not solely determined by the type and their concentration but also depends on the carrier itself.

27417

APTIC NO. 49490

Elenkov, D. and G. Grozev

IMPROVING THE SULFUR DIOXIDE ADSORPTION CAPACITY OF A XYLITE LOW-TEMPERATURE COKE THROUGH ACTIVATING ADDITIVES.

(Steigerung des Adsorptionsvermögens eines Xylitschwelkokes gegenüber Schwefeldioxid durch aktivierende Zusätze). Text in German. Wasser Luft Betrieb, 17(1):15-19, Jan. 1973. 10 refs.

The effects of catalytic activating additives such as copper, molybdenum, manganese, vanadium, and cobalt on the sulfur dioxide dynamic adsorption capacity of xylite low-temperature coke were studied. A 3-4 mm fraction low-temperature coke, a test temperature of 70 C, a model gas with 0.5% SO₂, and a gas residence time of 5.4 sec were applied for the experiments. The metal ions, added to the coke in the form of different salts, had a constant concentration of 2%. The adsorption efficiency was adjusted to 90%. Copper, vanadium, and cobalt additives and their combinations had the most pronounced effect on the SO₂ adsorption capacity of xylite low-temperature coke, while additions of manganese and molybdenum, either solely or in their combinations with the above elements, had no appreciable influence of the absorbent performance. An adsorbent specimen containing 2.50% Cu, 2.25% V, and 3.50% Co was most effective. Desorption at 600 C temperature increased considerably the adsorption capacity of the regenerated adsorbent, which even after the 12th desorption was higher than the original value, though it required somewhat higher adsorption temperature.

27418

APTIC NO. 49182

Glowiak, Bohdan and Adam Gostomczyk

STUDIES OF THE EFFECTIVENESS OF THE SORPTION OF SO₂ ON ION EXCHANGERS. I - LABORATORY STUDIES. (Untersuchungen ueber die Effektivitaet bei der Sorption von SO₂ auf Ionenaustauschern. Teil I - Laboruntersuchungen). Text in German. Staub, Reinhaltung Luft, 33(1):29-32, Jan. 1973. 12 refs.

The laboratory set-up for the sorption of sulfur dioxide consisted of the following components: a bottle with SO₂, a valve and rotameter, a container where the SO₂ and air were mixed, a glass column holding a layer of ion exchangers on sintered glass, a container for the ion exchanger solution after regeneration, plus a pump and devices for volume and concentration measurements. The ion exchanger was regenerated with a 6% solution of sodium hydroxide (1000 cc) and then washed with 5000 cu cm of distilled water. As an anion exchanger, wofatite in particles with diameters between 0.3 and 1.2 mm was used and a specially prepared anion exchanger with irregularly shaped bodies with lengths between 2 and 8 mm. The average quantity of SO₂ absorbed by 1l of wofatite was 10.47 g. The flow resistances grew with the throughput quantity of the gas, the sorption efficiency was simultaneously reduced. The latter depended more on the concentration of SO₂ before the column than on other parameters. The second type of anion exchangers permitted a reduction of

the flow resistances from 1900 mm water to 425 mm water. The average quantity of SO₂ absorbed by 1l of ion exchanger was 12.46 g.

27419

APTIC NO. 49087

Goodridge, Edward

STATUS REPORT: THE AGA/OCR COAL GASIFICATION PROGRAM. Coal Age, 78(1):54-59, Jan. 1973. 3 refs.

The American Gas Association and the Office of Coal Research are co-sponsoring a program to accelerate research on coal gasification processes through the pilot-plant stage. The best process will be selected for the design of a demonstration plant, which will be constructed at the end of 1975 and which will generate the engineering data required for construction of a commercial-scale plant in 1980. The seven candidate processes under evaluation are HYGAS, CO₂ Acceptor, BI-GAS, Agglomerated Ash, Synthane, Lurgi, and ATGAS. The HYGAS and Acceptor processes are in the pilot-plant stage and undergoing start-up tests. The Agglomerated Ash, Synthane, and BI-GAS processes should reach pilot-plant operation by 1974. A decision to build an ATGAS plant will be made after evaluation of further tests. The HYGAS process, in which coal is reacted with hydrogen at high temperature and pressure to produce methane, is the most advanced U. S. process. It has several advantages. All coal types are acceptable fuels; the hydrogasifier yields an offgas relative high in methane, thus minimizing the need for further methanation; and the process operates at pipeline pressure (1000 psi).

27420

APTIC NO. 49304

Harima, Mikio

DESIGN OF ABSORPTION COLUMN (I). (Kieki sesshoku sochi ni tsuite). Text in Japanese. Kagaku Sochi (Plant and Process), 15(2):42-53, Feb. 1973.

Absorption columns include those in which gas/fluid mixtures are scattered for better contact; where the fluid is scattered into the gas; where the gas is scattered into the fluid; and where mechanical mixing and scrubbing occur. Operating variables, selection criteria, and efficiency of these absorption columns are discussed. The absorption column is used in many industries, including the chemical industry, for pollution control.

27421

APTIC NO. 49420

Hattori, Shinji

DESIGN OF GAS RECOVERY EQUIPMENT (I). (Yugai gasu kaishu sochi no sekkei (I)). Text in Japanese. Kagaku Sochi (Plant and Process), 15(2):32-41, Feb. 1973.

A method of recovering high purity hydrogen fluoride from flue gases containing a lot of HF uses a combination of ordinary gas absorption and dispersion. The waste gas from the absorption tower is led to a cleaning tower where it is washed with water. By going through the lime layer at the top of the tower, the HF in the waste gas from the recovery system is kept at less than 1 ppm. The gas led into the absorption tower is 36 mol%, the temperature at the tower inlet is 23 C. The composition of waste gases from the absorption tower is to be 1.0 vol% HF, 11.11 vol% water, and 87.89 vol% air. The waste gas volume is 3.112 kmol/hr; its composition is 0.031 kmol/hr HF, 0.346 kmol/hr water, and 2.735 kmol/hr air. Almost 99.8% of the HF is recovered. Absorption of HF in the absorption tower is 15.469 kmol/hr and absorption in the packed tower is 15.305 kmol/hr.

27422

APTIC NO. 49983

Holz, Heinz

DESULFURIZATION OF COAL FOR POWER PLANTS BY SEPARATION. (Entschwefelung von Kraftwerkskohle durch aufbereitungstechnische Massnahmen). Text in German. Glueckauf (Essen), 109(3):208-212, Feb. 1, 1973.

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A new experimental plant for testing the various individual aggregates for the separation of pyrite from coal for power plants has been set up. The interactions of various machines will be tested, and adequate process combinations will be developed. The coal will be examined with respect to sulfur-ash distribution in the various grain size and density classes; sifting of the coal and examination of the sifted dust and dust-free coal will be examined with respect to sulfur-ash distribution; washing of the coal and removing the sludge followed by fine separation of the coal and the solid matter will occur in the sludge in a large plant comprising a water cyclone, screen basket, vibration screen, and flotation unit. The last four units are described.

27423

APTIC NO. 49386

Huebner, Jack

COAL GASIFICATION: STATE OF THE ART. *Heating, Piping, Air Conditioning*, 45(1):149-155, Jan. 1973.

The state-of-the-art of coal gasification processes is reviewed. Of the currently available fully commercial techniques, the Lurgi process is the only one applicable to synthetic pipeline gas production. A highly advanced version of hydrogasification is the HYGAS process, with three choices of techniques to produce the hydrogen-rich gas. Processes in the pilot plant stage include the carbon dioxide acceptor process, the BI-GAS process, and the synthane process.

27424

APTIC NO. 49296

Hughes, D.

THE RECOVERY OF COPPER AND ALUMINUM FROM CABLE WASTE MATERIAL. (*Die Rueckgewinnung von Kupfer und Aluminium aus Kabelabfaellen*). Text in German. *Metall* (Berlin), 27(2):172-174, Feb. 1973.

The conventional method of recovering copper and aluminum from cable waste material is incineration. This method not only pollutes the air, but also produces metal of lesser quality and losses through oxidation, chlorination and tap-off with the slag. At the incineration of polyvinyl chloride cable waste material, hydrogen chloride is emitted which cannot be removed from the waste gas by afterburning. A much more economical and less air polluting method is the mechanical recovery of the metals. A mechanical recovery plant comprises two impeller breakers, a conveyor belt, a two-storied vibration screen, and the separators. Two separation methods are available, the air separation based on the different sedimentation speed of the materials to be separated and the method taking advantage of the differing specific weights. The latter method requires an auxiliary medium for the separation which may be either a solid material or a mixture of air and solids with the latter being air-suspended. The second method has a separation efficiency of more than 98%. The current costs for a mechanical recovery plant are comparable to those of the incineration plant. The personnel costs are lower.

27425

APTIC NO. 49773

Iiya, Koichi and Kazutaka Makino

DUST COLLECTION. (*Shujin*). Text in Japanese. *Kagaku Kojo* (Chem. Factory), 17(1):57-61, Jan. 1973.

Dust collection in steel, cement, ferroalloy, foundry, chemical, and other industries is considered. Venturi scrubbers are used in blast furnaces, and converters recover carbon monoxide emitted by electric furnaces, during steel making. Dust collected in steel making is sintered and used again in the blast furnace. The bag filter method has become popular recently. The cement industry's dust collection technology seems to have been stabilized; electric dust collectors are used for kiln and cooler dust collection; bag filters are sometimes used for coolers. Electric dust collectors have the advantage over bag filters of being maintenance free. Many types of dust collection apparatuses are used for electric furnaces of the ferroalloy industry; open types are used for smaller electric furnaces, closed types for bigger ones. Bag filters are used for most of

the smaller electric furnaces. Physical and chemical characteristics of dust from ferroalloy processes must be studied. In a foundry, not much money can be spent on elaborate dust collection systems. Wet-type dust collection systems, which combine sulfur dioxide absorption and dust collection, are commonly used. Simplified bag filters are also used. It is difficult to generalize dust collection in the chemical industry which is varied. In the polymer industry, many dust collection systems are used to recover products after the drying process. Cyclones are used by the detergent industry to trap bigger particulates, and for smaller particulates such as polymer, bag filter systems are used. In power generation, dust from boilers is collected by electric or multi-cyclone processes or by combination of these.

27426

APTIC NO. 49762

Immendoerfer, M.

EXHAUST SYSTEMS FOR DRAWING OFF WASTE AIR FROM CHEMICAL TECHNICAL PROCESSES FROM THE VIEWPOINT OF OCCUPATIONAL MEDICINE. (*Abluftsysteme fuer chemisch-technische Prozesse aus arbeitsmedizinischer Sicht*). Text in German. *Zbl. Arbeitsmed.*, 23(2):42-48, 1973.

Various types (floor exhaust, lateral exhaust, and top exhaust) of exhaust systems for drawing off waste air from chemical technical processes are discussed. The exhaust hood must be installed as close to the air pollution source as possible. Vapors and solvents are mostly heavier than air and should be drawn off by floor-installed exhaust systems. The air quantity which is necessary for efficient drawing off of the waste air depends primarily on the geometry of the opening of the exhaust hood and the screens, the air velocity, and the size of the opening. This air quantity must be known for calculation of the ventilator power. Turbulences at the entrance must be avoided.

27427

APTIC NO. 49321

Inagaki, Kineo

DUSTS CONTROL FOR CLOISONNE OVEN. (*Shipporo no funjin boshi*). Text in Japanese. *Kagaku Kogyo* (Tokyo), 24(3):416-421, March 1973. 2 refs.

Frit glaze used for cloisonne contains lead, whose emission into atmosphere must be prevented. The melting point of lead is 327 C, boiling point, 1718 C. From 450 C, evaporation starts briskly and lead dust is emitted as a fume, with less than 1-micron particles. Therefore, an adequate type of dust collector should be chosen, taking into consideration meteorological changes, factory site, and volume of dust and lead. For dust over 10 micron, a centrifuge and for dust less than a few micron filtering, electric dust collector, or a scrubber should be adopted. For the scrubber the dust volume should be under 10 g/N cu m; for electric dust collection, less than 30 g/N cu m; and for filtering as low a concentration as possible. One dust collection process especially designed for a cloisonne manufacturer is shown. It consists of a hood, open on one side, to suck in air from the processes of throwing raw material into crucible. The dust collector is equipped with a filtering cloth, cabinet, dust tube, shaking device, and blower. In order to prevent noise, a muffler is attached at the outlet. The air containing dust is led from hopper and dispersed into dust tubes where dust is separated. The shaker is for cleaning dust tubes. The whole process is designed to maintain the lead-containing dust concentration less than 0.15 mg/cu m in the atmosphere (8 hours), and less than 0.006 mg/N cu m lead concentration so that dust emitted is 0.002 g/N cu m and lead concentration emitted is 2 mg/N cu m.

27428

APTIC NO. 49979

Kantner, A. and W. Kersting

INCINERATION, A CONTRIBUTION TO ENVIRONMENTAL PROTECTION. (*Muellverbrennung, ein Beitrag zum Umweltschutz*). Text in German. *VGB Kraftwerkstechnik*, 53(1):62-68, Jan. 1973.

Great progress has been made in modern incinerators with respect to flue gas cleaning. High-capacity filters with a collection efficiency of 99% and more have been developed. They permit a reduction of the dust concentration to 150 mg/cu m flue gas. Apart from dust the waste gases from incinerators contain carbon dioxide, sulfur dioxide, hydrogen chloride, and hydrogen fluoride. Depending on the type of waste material, the emitted concentrations of HCl fluctuate between 0.2 and 0.8 g/cu m, of SO₂ between 0.2 and 1.2 g/cu m, HF up to 3 mg/cu m, and 7% CO₂. The most efficient means of reducing local, as well as temporal, peaks of toxic flue gas components, is the construction of high stacks. The Frankfurt and Kassel incinerators have a stack height of 110 m, the Munich incinerators of 80, 130 and 145 m, the Mannheim incinerator of 146 m, the Nuremberg incinerator of 100 m, the Stuttgart incinerator of 180 m and the Berlin-Ruhleben incinerator of 76 m. Flue gas scrubbing is technically feasible, but has the disadvantage of creating a water pollution problem. Moreover, the cooled waste gases lack thermal buoyancy. The costs for flue gas cleaning systems, extra high stacks, and other measures necessary for the operation of an incinerator without annoying the environment are estimated to amount to 12% of the investment costs of a large incinerator.

27429

APTIC NO. 49594

Kimura, Hiroshi

PLASTIC MATERIALS USED IN PUBLIC NUISANCE PREVENTION DEVICES, AND THEIR PROCESSING EQUIPMENT. (*Kogaiboshi kanren sochi ni shiyo sareru purasuchikku zairyo oyobi kakosochi ni suite*). Text in Japanese. Preprint, Japan Welding Assoc., Tokyo, 29p., 1973, 6 refs. (Presented at the Seminar on Plastics Used in Public Nuisance Prevention Devices and their Processing Techniques, Osaka, Japan, Feb. 19-20, 1973.)

The resistance of plastic materials to corrosion by water and air pollution is discussed. Plastics are often used in air pollution control equipment such as cyclones, venturi scrubbers, bag filters, and electrostatic precipitators. General guidelines on selection of plastic material that will suit specific purposes are discussed.

27430

APTIC NO. 49596

Kiritani, Yoshio

METHOD TO SMOKELESSLY LOAD A COKE OVEN WITH COAL. (*Kokusuro no muen sotanhoho*). Text in Japanese. (*Sumikin Kako Co., Ltd., Wakayama (Japan)*) Japan. Pat. Sho 48-4842. 7p., Feb. 12, 1973. (Appl. Oct. 27, 1969, 1 claim).

When coal enters the carbonization chambers of a coke oven, part of it discharges water vapor and gases. The gas can be discharged, taking coal dust and other particulates with it. To prevent air pollution, a smokeless feed method was developed in which the dusty gas is lead into a gas collection duct and collected with the generated coal gas and then sent through a dust remover on the coal feeder cart. Only one of every five carbonization chambers is fed at a time, so the last carbonization chamber of the five produces only 1/3 the amount of coal gas generated in the earlier stage. Thus, dusty coal gas is cleaned in the cart and sent to the final carbonization chamber which can accept more gas.

27431

APTIC NO. 49597

Kiritani, Yoshio and Sadayoshi Kamihara

DISPOSAL METHOD OF A GAS CONTAINING COAL DUST GENERATED WHEN LOADING A COKE OVEN WITH COAL. (*Kokusuro no sotanji ni okeru tanjinyan gasu no shorihoho*). Text in Japanese. (*Sumikin Kako Co., Ltd., Wakayama (Japan)*) Japan. Pat. Sho 48-4841. 2p., Feb. 12, 1973. (Appl. Sept. 30, 1969, 2 claims).

Coal dust generated when loading a coke oven with coal can be collected by two pipelines -- one collecting dust and coal

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gas generated as a result of the heating of coal and one collecting dusty coal gas generated during coal feeding. The coal dust collected by the dust collector connected to the pipelines is taken out periodically and used as a fuel or for other purposes. In addition, coal feeding carts may be equipped with dust collectors. Dusty gas emitted through the feed-in port at coal feeding may be collected by these dust collectors and fed into the pipeline system.

27432

APTIC NO. 49615

Kiritani, Yoshio

DUST REMOVAL WITH A COAL LOADER CART. (*Sotansha no jojinoho*). Text in Japanese. (*Sumikin Kako Co., Ltd., Wakayama (Japan)*) Japan. Pat. Sho 48-4843. 4p., Feb. 12, 1973. (Appl. Oct. 27, 1969, 1 claim).

A dust removal method is described to ensure smokeless coal loading for a coke oven. The coal loader cart is equipped with a dust remover to clean dusty gases generated during coal feeding. Since manufactured coke is taken from one of every five chambers at a time, the final carbonization chamber of the five has only 1/3 the coal gas of the first. Thus, dusty gas is cleaned in the cart and fed into the carbonization chamber two chambers away from the one being loaded with a new supply of coal so that the cleaned gas may be recovered with the normal coal gas through the main gas collector duct.

27433

APTIC NO. 49532

Kodera, Goro, Saburo Nishimatsu, and Toshihiko Ito

MANUFACTURING METHOD FOR AIR FILTER MATERIAL. (*Kukirokazai no seizoho*). Text in Japanese. (*Honshu Paper Mfg. Co., Ltd., Tokyo, (Japan)*) Japan. Pat. Sho 48-99. 4p., Jan. 5, 1973, 1 ref. (Appl. March 1, 1969, 1 claim).

A manufacturing method for filter material is described. First, non-woven cloth or web is manufactured from natural fiber, regenerated fiber, or synthetic fiber. The material is shredded and processed to make fleece. An emulsion bonding agent is sprayed onto the fleece, which is then pressed and dried to make the web or non-woven cloth. Two or more of these webs, each usually of a different density, are bonded together by the method suggested in this invention. This method maintains the original density of each web. The air filter can effectively filter both fine and coarse dust particulates without clogging for a longer time than similar filters manufactured by other methods.

27434

APTIC NO. 49593

Maeda, Isamu

MANUFACTURING METHOD OF SULFURIC ACID. (*Ryusan seizoho*). Text in Japanese. (*Sumitomo Shipbuilding Machinery Co., Tokyo (Japan)*) Japan. Pat. Sho 48-4719. 6p., Feb. 10, 1973. 2 refs. (Appl. June 25, 1968, 1 claim).

A new method is described for producing sulfuric acid by converting sulfur dioxide to sulfur trioxide. The SO₂ emitted by the process is recovered (100%) and used to produce more H₂SO₄. In the process the SO₂ or SO₃ mist contained in the flue gas discharged from the adsorption tower is adsorbed by active carbon or a similar adsorbent to purify the final emitted gas. The SO₂ or SO₃ is then desorbed by washing the adsorbent with water or acid to produce dilute sulfuric acid which is recirculated into the sulfuric acid manufacturing system. The adsorbent is dried and regenerated for reuse by making use of the reaction heat produced by conversion of SO₂ to SO₃.

27435

APTIC NO. 49538

Matsuura, Minoru, Osamu Saheki, and Katsumi Kakiuchi

DISPOSAL METHOD OF ELECTRIC FURNACE EMISSION GAS. (*Denkiro haigasu no shorihoho*). Text in Japanese. (*Kobe Steel Co. (Japan)*) Japan. Pat. Sho 48-362. 3p., Jan. 8, 1973. (Appl. June 18, 1969, 1 claim).

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Exhaust gases from an electric furnace and converter used in ferro-alloy manufacturing are cleaned of dust in a venturi scrubber, sent to a gas holder, and mixed. Blast furnace gas is similarly cleaned, stored in a gas holder, and sent to the gas mixer from time to time in a proper amount determined on the basis of the specified mixing ratio. The mixture of gases containing high-concentration carbon monoxide is cleaned by a second-stage scrubber and then distributed to facilities such as the blast furnace, coke oven, boiler, and rolling mill to be utilized as a heat source.

27436

APTIC NO. 49399

Morita, Yoshio

TECHNIQUE AND SYSTEM OF GASIFICATION AND DESULFURIZATION OF HEAVY OIL. (*Gasuka datsuryu no gijutsu to sisutemu*). Text in Japanese. *Netsu Kanri to Kogai* (Heat Management Public Nuisance), 25(2):20-25, Feb. 1973.

For gasification of heavy oil, various processes have been developed such as steam cracking, coking (delayed, fluid, contact, flexicoking), high temperature partial oxidation (by air, oxygen, and steam), and hydrogenization cracking. However, there is no perfect process applicable to heavy oil. At present, flexicoking and Shell methods are scheduled to be industrialized, and the Texaco and Ube methods are making progress. The coking method is not complete gasification; the flexicoking process has been developed for gasification and desulfurization, and would be adopted by oil refinery companies. Although the partial oxidation method is a complete gasification method, the calorific value generated is low, and can be applicable only as power generation fuel, and not as city gas. Hydrogenization cracking does produce stabilized gas with high calorific value, but its cost is high, and there is not much use other than for city gas. When full-fledged gasification of heavy oil is in operation, power companies would be its major user, followed by city gas and the iron and steel making industry. Industrial complexes, especially petrochemical complexes, can have the equipment specially designed. Oil refineries, since they do not want to gasify all of the oil, but want to sell as much liquid fuel as possible, would have to have their own process.

27437

APTIC NO. 49657

Murata, Tsunenori

RARE GAS HOLDUP SYSTEMS. (*Ki-gasu horudo appu shisutemu*). *Kuki Seijo* (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(2):55-62, June 1972. 9 refs. Translated from Japanese. *Leo Kanner Assoc.*, Redwood City, Calif., 25p., Jan. 1973.

Rare gas holdup systems for reducing radioactivity of radioactive rare gases in nuclear reactors are discussed. When off-gases are passed through an adsorption tower packed with active carbon, the air, which makes up the majority of the off-gases, will pass through, while the rare gases will be adsorbed reversibly in the active carbon tower. The off-gases are kept for a certain period of time in the active carbon tower, during which time the rare gases with a short half-life become attenuated. Rare gas holdup devices apply this principle. The development of rare gas holdup devices is reviewed, the basic operating principle is described in detail; and their effectiveness evaluated. Effects of various factors in K values, especially the influence of the type of active carbon used, temperature, pressure, steam, flow rates, or the presence of other gases are discussed. The efficiency of actual plant equipment and performance tests of prototype devices are reviewed. Specifications for actual size equipment are listed.

27438

APTIC NO. 49501

Nakamura, Harutoki

EXHAUST PIPE FOR EXHAUST GAS CLEANING. (*Haikigasu jokayo haikikan*). Text in Japanese. (Matsushita Electric Industrial Co., Ltd., Kadoma (Japan)) *Japan. Pat. Sho 48-986*. 3p., Jan. 12, 1973. (Appl. Dec. 19, 1969, 1 claim).

A glass chopped strand catalyst featuring a pipe-like shape can be easily fitted into the exhaust pipe of an automobile. The strands are coated with a catalyst and are used to line the exhaust pipe. An air inlet for secondary combustion air is also provided in the exhaust pipe.

27439

APTIC NO. 49502

Nakamura, Harutoki

EXHAUST GAS CLEANER. (*Haikigasu jokasochi*). Text in Japanese. (Matsushita Electric Industrial Co., Ltd., Kadoma (Japan)) *Japan. Pat. Sho 48-985*. 2p., Jan. 12, 1973. (Appl. Dec. 18, 1969, 1 claim).

A catalyst-type exhaust gas cleaner is described that is easier and less expensive, yet gives higher efficiency in automotive exhaust gas cleaning. Fine glass chopped strands are bonded together in the form of a rod, put into the intake port, placed horizontally in the tubular casing, dried, and washed. A metallic salt mixture composed of three parts chromium nitrate, one part nickel nitrate, and one-half part cobalt acetate is dissolved in ion exchange water. The solution is placed into the intake port where the glass strands are immersed and then ejected from the discharge port. The strands are dried at 105-130 C for 2-3 hr and then heated to 300 C to pyrolyze and activate the metallic salt immersed in the glass strands, thereby obtaining the catalyst.

27440

APTIC NO. 49503

Nakamura, Harutoki

EXHAUST GAS CLEANER. (*Haikigasu jokasochi*). Text in Japanese. (Matsushita Electric Industrial Co., Ltd., Kadoma (Japan)) *Japan. Pat. Sho 48-984*. 4p., Jan. 12, 1973. (Appl. Dec. 17, 1969, 1 claim).

A catalyst-type exhaust gas cleaner is discussed which features a glass chopped strand carrier with a catalyst composed of cobalt oxide and copper oxide. The exhaust gas cleaner is tubular and connected to the exhaust pipe of the automobile. The catalysts are placed horizontally in a compartment formed by two perforated side plates and are held in place by nettings. The method of manufacturing the catalyst is described. The catalyst weight is 15-30% of the glass chopped strand carrier. The catalyst is mainly composed of cobalt oxide (65-70%) and copper oxide (30-35%). The ratio should be 60 parts or less copper oxide to 100 parts of cobalt oxide.

27441

APTIC NO. 49310

Nishiba, Yoshiharu and Kazuhiko Ota

OXIDATION DESULFURIZATION METHOD FOR GASES CONTAINING SULFUR COMPOUNDS. (*Iwakagobutsu o ganyusuru kitai no sankadatsuryuhoho*). Text in Japanese. (Daiki Rubber Industrial Co., Ltd., Tokyo (Japan)) *Japan. Pat. Sho 48-3066*. 3p., Jan. 29, 1973. 1 ref. (Appl. Dec. 26, 1968, 1 claim).

A desulfurization method for gases containing sulfur dioxide or sulfur trioxide is discussed. The gas is scrubbed with a solution of oxygen compounds of halogenic acids characterized by high oxidation potentials (for example, a mixture of hypochlorous acid or hypochlorite and alkali) to absorb the SO_x and oxidize the SO_x to sulfate. The product of the oxidation is removed and sodium chloride is recirculated for use within the system.

27442

APTIC NO. 49075

Ohara, Michio

PROMOTION OF POLLUTION PREVENTION MEASURES IN HEAVY INDUSTRIES. (*Jukogyo no okeru kogai anzen taisaku no suishin*). Text in Japanese. *Tsusansho Koho* (Gaz. Minist. Int. Trade Ind.), no. 6944:16-18, Jan. 12, 1973.

Countermeasures were promoted by the government on PCB (polychlorinated biphenyls) pollution from electric appliances, pollution from automobiles, and steel industry pollution. The

plan for PCB control includes the formation of a Council and the establishment of a monitoring system. The budget for the PCB control plan is \$40,000. Exchanges of technical information on the control of automotive exhaust with other countries including America, West Germany, England, Italy, and Sweden are in progress. The government is also promoting the development of low-pollution automobiles. In 1972, a general investigation of sulfur oxide concentration at all major steel manufacturers took place, and countermeasures were enforced. In 1973, the control will be extended to nitrogen oxides, and in 1974 to particulates and sludge.

27443

APTIC NO. 49327

Ploeckinger, Friedrich

REFUSE REMOVAL AND CLEANING METHODS OF INDUSTRIAL FLUE GASES. (*Muellbeseitigung und Reinigungsmethoden industrieller Abgase*). Text in German. *Umweltschutz Staedtereinigung* (Vienna), 10(1):7-15, 1973.

Photographs taken by Apollo 8 were used to determine the highest concentration of smog over Tokyo and Osaka, amounting to 8.5-9 t/sq km of dust. Harmful gases found in the air are carbon monoxide, sulfur dioxide, chlorides, and hydrocarbons. Industrial flue gases can be cleaned by mechanical dedusters such as dust chambers, impact plates, or cyclones. The efficiency of cyclones for example is 90 to 95%. Wet cleaning devices are based on the principle that dust may be bound by accelerated water drops. A classic wet cleaning device is the venturi tube consisting of a mixing zone and a diffusor. The gas which is charged with dust is accelerated and at the smallest diameter of the tube the washing liquid is blown into the gas current, absorbing the dust particles. Filter dedusters consist of a tissue layer which retains the dust particles. In an electrostatic filter system, the dust particles are positively or negatively charged and then attracted by a contrarily charged settling diode. The emission of harmful gases into the air can be prevented either by the desulfurization of the solid and liquid combustibles before combustion, influencing of the combustion process by means of additives like lime, or by the desulfurization of flue gases. In a special desulfurization process the sulfur dioxide is absorbed by a substance consisting of metallic oxides which can be regenerated afterwards.

27444

APTIC NO. 49491

Poetschke, Herbert

COMPRESSED AIR FOR WATER POLLUTION AND EMISSION CONTROL. (*Druckluft zum Schutz gegen Gewaesserverschmutzung und Emissionen*). Text in German. *Wasser Luft Betrieb*, 17(1):12-14, Jan. 1973.

Recent developments by Atlas Copco in water and air pollution as well as noise abatement areas are described. New earth and rock boring equipment are provided with DCE model vacuum devices for sucking in fine chips and dust produced by the drill, and separating them in a dust bag. Since only harmful dust is sucked in, bag change intervals are considerably extended.

27445

APTIC NO. 49078

Pring, Robert T.

FABRIC FILTER: ANOTHER OPTION FOR FLUE GAS CLEANUP. *Power Eng.*, 77(1):48-51, Jan. 1973.

Baghouses as particulate collectors for low-sulfur high-ash fuel combustion are reviewed. Coal-fired boilers in power plants are considered, and control technology is reviewed with respect to particulate and sulfur dioxide emission standards, fabric collector design, development, testing, and costs. The feasibility of effecting both particulate and SO₂ control through the baghouse system is examined. Emission standards are listed.

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27446

APTIC NO. 49214

Ranhagen, G.

THE ENTIRELY CLOSED MILL - A UTOPIA OR A REALISTIC APPROACH. *Paper Trade J.*, 157(4):22-28, Jan. 1973. (Presented at the Polish Pulp and Paper Industry, International Conference, 5th, Cracow, Poland, Sept. 19-22, 1972.)

Present and near-future ways and means for closing an integrated kraft pulp and paper mill for air and water pollution control are discussed. Condensates can be cleaned by stripping and burning the waste in a boiler. To eliminate the operating cost for the process, the first evaporator stage can be used as a return cooler for the stripping column. The removal efficiency is estimated to be practically 100% for hydrogen sulfide and methyl mercaptan, and 90% for methanol, terpenes, and the remaining sulfur compounds. Odorous emissions (hydrogen sulfide and traces of organic sulfur compounds) from the recovery boiler can be abated by the use of high primary air, which ensures complete combustion of the sulfur compounds. Reduction of sulfur emission is obtained by washing the flue gases with weak white liquor in a specially designed scrubber reducing the sulfur dioxide content by 95%. A new washing system chosen for a mill with no effluent discharge includes digester washing, a radial washer, final screening system, a filter washer, and a press washer.

27447

APTIC NO. 49072

Rauenbusch, H. and K. Zeilinger

ELECTRONIC CONTROL OF THE FUEL QUANTITY INJECTED IN OTTO ENGINES. (*Elektronischer Raumnocken zur Steuerung der Einspritzmenge von Ottomotoren*). Text in German. *Motortech. Z. (Stuttgart)*, 34(3):73-76, 1973. 3 refs.

In the wake of the efforts to reduce exhaust gas emissions, the demands on the accuracy of controlling the injected fuel quantity in Otto engines have risen. Thus a new electronic control was developed to operate with the gasoline injection system Jetronic. The basis of the design is the injection-quantity-performance-graph which plots the desired fuel quantity Q for every operating state. The simplest and most exact way to describe the operating state is by use of the rpm and the throttle valve angle, α . One of the two parameters is kept constant by electronic control; by means of function generators, Q is found to depend on the second parameter. Of the two possibilities available, a system was developed with which curves of Q as a function of α are produced in the function generators for a number selectable rpms. At a change of the rpm, a relay switches from one function generator to another. A linear interpolation is performed between the Q -values of two function generators. The unit comprises three basic components, the function generators, the rpm switch with interpolation, and the voltage stabilizer. The last component is made of conventional electronic parts so that the circuit design is described and illustrated only for the first two components.

27448

APTIC NO. 49770

Reichl, Eric H.

HARD COAL MINING IN THE USA AND ITS FUTURE PROSPECTS. (*Der Steinkohlebergbau der USA und seine Zukunftsaussichten*). Text in German. *Glueckauf* (Essen), 109(3):165-178, Feb 1, 1973.

The coal resources of the United States are enormous so that coal will be increasingly used to compensate for the growing lack of oil and gas. The increased use of coal in power plants calls for new solutions of the emission problems it creates. Three ways are flue gas cleaning, coal gasification, and liquefying. Most flue gas cleaners are operated with lime or limestone either directly injected with the fuel or by scrubbing the flue gas. Other methods of flue gas cleaning recover the sulfur in form of sulfur dioxide, sulfuric acid, or as elemental sulfur. One such method is scrubbing with magnesium oxide

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sludge. The SO₂ can be catalytically oxidized to sulfur dioxide and washed out in form of sulfuric acid. None of the flue gas scrubbing methods removes the oxides of nitrogen. Contact of the flue gases with copper catalysts or activated coal dissociate the oxides of nitrogen. A flue gas desulfurization plant on the basis of activated coal is planned which can be annexed to an existing boiler and combines the removal of NO and SO₂. For coal gasification in the power plant, the Lurgi process is available. Liquefying of coal requires two-stage extraction or low-temperature treatment and hydration with cobalt-molybdenum catalysts.

27449

APTIC NO. 49305

Roberts, Ralph

ENERGY SOURCES AND CONVERSION TECHNIQUES.

Am. Scientist, 61(1):66-75, Jan./Feb. 1973. 31 refs.

Potential energy sources and the status of currently noncommercialized energy conservation methods are summarized. Four categories of energy sources are considered: environmental, chemical, nuclear, and mechanical. Environmental sources include solar energy, energy resulting from thermal effects or gradients in the earth and ocean, and gravitational forces of tides and water flow. Chemical sources include coal and shale, which can be converted to gaseous and liquid fuels. Nuclear energy sources are thermal reactors, breeder reactors, and fusion power. Mechanical sources include energy storage in flywheels. Two groups of energy conversion methods are described: rotating machinery and nonrotating methods. Examples of the first group are gas turbines, electric generators, steam engines, and Diesel and Otto cycles. Nonrotating methods are thermoelectrics, photovoltaics, thermionic power generation, fuel cells, and magnetohydrodynamics. With the depletion of fossil fuel resources, there will be more dependence on nuclear, solar, and geothermal energy. Fossil fuel utilization can be extended through commercialization of coal gasification and liquefaction processes. The basic technology exists for using coal as a source of low-ash and low-sulfur fuel. Inexpensive electric power, as projected for nuclear sources, could make hydrogen economically competitive with fossil fuels. The use of gas turbines or open-cycle magnetohydrodynamic systems as topping cycles to steam turbine power plants is another means of extending fossil fuel supplies. The next 5-10 years will demonstrate which of these approaches is the more economic within prevailing antipollution requirements. Recent research indicates that nuclear fusion may ultimately be feasible for power generation. At the present, the most promising use of solar energy is in reducing fossil fuel and electricity requirements for home heating. Geothermal energy sources are valuable sources for power production without chemical pollution or radiation hazards.

27450

APTIC NO. 49376

Ross, L. W. and J. N. Pecoraro

POLLUTION SOLUTIONS? A LOOK AT NASA SPACE R AND D COULD SUPPLY ANSWERS. *Mech. Eng.*, 95(1):8-13, Jan. 1973. 10 refs.

The life-support mission of NASA has the same broad objectives as the national goals toward environmental restoration: pure air, clean water, and the reuse of resources. The major difference is the scale of application, but the techniques developed by NASA are definitely applicable to the problem of environmental resource management and pollution control. The design and operating variables of some NASA research and development products and their environmental applications are reviewed, including an air purification system; nitric oxide reduction through electrolysis; water treatment; waste treatment techniques; and the conversion of wastes to food.

27451

APTIC NO. 49220

Rueb, Friedmund

SYSTEMS AND EQUIPMENT FOR THE ELIMINATION OF TOXIC GASES, MISTS, AND VAPORS. (*Systeme*

und Anlagen zur Beseitigung schaedlicher Gase, Duenste und Duempfe). Text in German. *Energie Tech.*, 25(1):15-19, 1973.

The removal of gaseous pollutants, mists, and vapors by scrubbing, adsorption on activated coal, and thermal and catalytic afterburning is discussed. For the scrubbing of gases, the absorption tower, various kinds of packed towers, and ordinary scrubbers can be used. Such units are briefly reviewed. A new construction is the centrifugal agglomerator which takes advantage of the higher falling speed or movement by aerosols in a strong field of gravity which is produced artificially in a rotor equipped with acceleration vanes for the gas and for the scrubbing fluid. The cleaning of waste gases by adsorption on activated coal offers the possibility of recovering solvents such as hydrocarbons. Should organic pollutants which are not solvents be recovered, thermal or catalytic afterburning can be applied. The advantages and disadvantages of the latter methods are outlined.

27452

APTIC NO. 49297

Sawada, Seiji and Kenzo Abe

DESULFURIZATION OF GAS CONTAINING HYDROGEN SULFIDE. (*Ryukasuio o ganyusuru gasu no datsuryuhoho*). Text in Japanese. (*Nippon Soda Co., Ltd., Tokyo (Japan)*) Japan. Pat. Sho 48-3751. 2p., Feb. 1, 1973. 2 refs. (Appl. Oct. 7, 1970, 1 claim).

A wet desulfurization process is described which has 99% or higher desulfurization efficiency and which is continuous yet economical. A gas containing carbon dioxide is contacted to an alkali solution with an adjusted pH value of 11.50 to 12.50 to absorb hydrogen sulfide while suppressing the CO₂ reaction. The exhaust mixture is contacted with the solution in an absorption tower with spray nozzles. As the gas ascends it is scrubbed with the alkali solution and is released through a discharge port.

27453

APTIC NO. 49592

Shinobiashi, Yoshimi

METAL MELTING FURNACE. (*Kinzoku yokairo*). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 48-4692. 3p., Feb. 10, 1973. (Appl. July 9, 1968, 1 claim).

A metal melting furnace such as a crucible furnace is described which melts scrap from aluminum, copper, or zinc processing. Smoke with violent heat convection is emitted; it is collected and mixed with air, heavy oil, or propane and combusted as a fuel for the heating burner. The furnace is covered with a lid that can be opened when feeding in scrap and that can be closed and made airtight at other times. The oil vapor, aerosols, and smoke exit through an outlet in the cover and then enter the heating burner for further combustion.

27454

APTIC NO. 49373

Stein, Jane

COAL IS CHEAP, HATED, ABUNDANT, FILTHY. NEEDED. *Smithsonian*, 3(11):18-27, Feb. 1973.

Due to growing energy demands, coal consumption is expected to increase again. National reserves of natural gas and oil are limited and dwindling, and the nuclear power potential will not be realized until 1985. The disadvantages of using coal as a primary fuel, including the problem of strip mining, are discussed. Coal gasification has potential for control of pollution, but only one commercially proved method operates today; other techniques, therefore, must be researched for economic feasibility, since the final product is expensive.

27455

APTIC NO. 49173

Steihl, Hans-H.

THE APPLICATION OF AIR FILTERS IN MEDICINE AND EXPERIMENTAL BIOLOGY. (*Die Anwendung*

von Luftfiltern in der Medizin und experimentellen Biologie). Text in German. *Gesundh.-Ingr.*, 94(2):51-59, 1973. 10 refs.

The retention of pathogenic germs (bacteria and viruses by air filters) was studied. Air filters are made of glass or synthetic fiber with diameters between 0.3 and 2 micron. A measure for the effect of air filters is the degree of the passage of aerosols in percent which is determined from the ratio of the quantity of test aerosols on the entrance and exit side. The intensity of the light scattered by the aerosols or the mass of aerosols per volume unit of air is used as a measure for the aerosol quantity. Based on the numerous interactions of particles and fibers in the flow of air, the degree of passage depends on the fiber radius, the radius of aerosol particles, the layer thickness of the filtering material, the porosity, and the entrance velocity of the air. Measurements of the degree of passage in fiber filters reported in the literature indicate that the passage decreases for particles with diameters below 0.2 micron. A maximum passage was found at about 0.3 micron. These results agree with the results from theoretical studies. The air entrance velocity also influences the passage. A maximum was with an entrance of 25 cm/sec at aerosol diameters of 0.3 micron. For technical use entrance velocities of 10 cm/sec are customarily used. With this velocity the maximum passage is with particle diameters between 0.1 and 0.4 micron. Theory and experiment indicate that particles of the size of viruses and bacteria can be retained in fiber filters with a degree of passage that is smaller than with mist particles of 0.3 micron diameter. The maintenance and operation of air filters in hospitals is discussed.

27456

APTIC NO. 49602

Takahashi, Katsuyuki

CUPOLA DUST COLLECTION BY A HITACHI STATIC ELECTRICITY MAT FILTER. (*Hitachi seiden matto firuta ni yoru kyupora shujin*). Text in Japanese. *Kogai Boshu Sangyo (Environ. Pollution Control)*, 13(2):33-38, Feb. 1973.

The regulation on emission control from cupolas of foundries became stringent in June 1971, being about 1/10 of the old standard. The construction cost of the cupola furnace proper is about \$5,000/ton of molten metal produced, while that of dust collecting equipment requires \$10,000/ton. Of 3500 cupolas in Japan, about 500 are obliged to be equipped with dust collecting devices, but as yet less than 10% are actually conforming to the law. Hitachi's static electric mat filter guarantees less than 0.2 g/N cu m at the outlet, although it is difficult to collect fine dust from cupola. It can be designed according to the kind of gas and dust the device has to deal with, but, due to the material of mat filter, there is certain limitation in temperature of gas to be treated. Electrodes for discharge and dust collection are made of anti-corrosive steel material. The primary filter is heat-proof, and the secondary filter and demister are made of polypropylene. A specially designed drain receiver prevents cleaning water from scattering and assures even gas distribution. A safety valve is provided to prevent damage to equipment by carbon monoxide explosion. A cooling tower placed in front of mat filter improves the dust collection capacity. Cleaning water for the filter is recycled back to cooling tower so that the running cost is lowered.

27457

APTIC NO. 49404

Wakatsuki, Hideo

ODOR ELIMINATION BY WASTE GAS COMBUSTION. (*Haigasu nensho ni yoru akushu jokyo*). Text in Japanese. *Nenryo Oyobi Nensho (Fuel and Combustion)*, 40(1):1195-1200, Jan. 1973.

In order to eliminate the odor of styrene in the gas emitted during drying processes of synthetic rubber, various methods were tried, such as the combustion method, using platinum as a catalyst, adsorption, and using activated coal or a solvent, but they were unsatisfactory industrially. Stacks to diffuse

odor, 40 m high, also proved to be unsatisfactory. Instead of emitting odorous gases into the atmosphere, the gases can be used for boiler combustion. Although the gas to be eliminated contains explosive matter, it is within the range of combustion, so that there is no need for a water seal. It is not corrosive, the equipment cost is low, and no extra device is necessary for the boiler. Since the gas is humid, and must be transported a long way before it reaches the boiler; in winter or in rainy weather, after releasing heat, the accumulated water must be drained off. A filter is required to prevent particles from adhering to a boiler air preheater or accumulating in the duct. Even while in operation, filter cleaning is possible. Air required by a boiler must be balanced, since the waste gas volume varies. The capacity of a duct is 4500 cu m/min; velocity, 13.6 m/sec as a maximum. Filters must be selected to be in keeping with the characteristics of the waste gas. Since the start of operation of this system in May 1969, complaints from residents decreased drastically. But there are a few unsolved problems such as clogging of a boiler air preheater.

27458

APTIC NO. 49190

Watabe, Teruo

CHARACTERISTICS OF DUST COLLECTION EQUIPMENT ON THE ROOF AND INFORMATION ON ITS DESIGN. (*Tateya shujin sochi no tokucho to sekkeijo no pointo*). Text in Japanese. *Kagaku Kojo (Chem. Factory)*, 17(2):87-91, Feb. 1973.

Dust collection equipment placed on the roof is used to prevent air pollution outside and improve working conditions. It can be classified into three types: natural ventilation systems, closed systems, and forced ventilation systems. Natural ventilation systems have lower running costs, need no extra space for the dust collector, blower, or motor, have easy maintenance, and produce no noise. Converters and electric furnaces require dust collection for the whole building. In order to design such equipment, it is necessary to understand the volume and temperature of the gas and dust emitted. It is safe to estimate the dust volume to be less than 1 g/N cu m except in special cases, but peak period, frequency, intervals, particle distribution, and composition of dust, must be studied. Cottrells should be placed only where dust passes through for economy's sake. Strength of beams must be studied in existing buildings.

27459

APTIC NO. 49546

Watabe, Teruo

DUST COLLECTION DEVICES FOR INDUSTRIAL BUILDINGS. (*Kogyoyo tateya shujin sochi*). Text in Japanese. *Sangyo Kogai (Ind. Public Nuisance)*, 9(1):60-64, Jan. 1973.

For factory buildings, which cannot adopt any other type of dust collection system, it is better to mount an electric dust collector on the top of the building, since it does not require a motor for the blower, nor a hood or duct. Neither does it require any extra space for installing a dust collector, blower, or motor, so that it can be installed on top of existing factory buildings. It is easy to maintain, since there is no equipment such as blowers or motors operating. The gas containing dust goes up, is diffused, and is led into the electrostatic precipitator which separates the gas into dust and clean gas. Cleaned gas is emitted from the top of the open precipitator. The dust trapped by the electrode plate is washed by an intermittent washing device, and the slurry is led to the effluent treatment process. Synthetic resin, which conducts electricity, has been used for the process to make it light and to withstand weather. An intermittent washing system was adopted, since it is undesirable to have any vibrating device on top of buildings. This sort of system can be used for steel-making, non-ferrous, cement, chemical industries, electric furnaces, and converters. It is necessary to test the strength of the structural beams of factory buildings which have been erected already, before this type of dust collection equipment is installed.

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APTIC NO. 49608

Wolf, Friedrich, Siegfried Kreissl, and Olaf Sonntag

THE CATALYTIC OXIDATION OF HCL. (Zur katalytischen Oxydation von HCl). Text in German. Chem. Tech. (Berlin), 25(1):37-40, Jan. 1973. 3 refs.

The catalytic oxidation of hydrogen chloride on various kinds of catalysts was studied at 430 C. As a reactor, a pyrex glass tube of 410 mm length and 20 mm diameter was used. All catalysts were produced by placing the carrier material with a grain size of 0.8 to 1.0 mm into an aqueous solution of metal salts. As carrier material, silica gel A and B, supergel I, II, porous glass A, B, bidisperse porous glass, alpha-clay, gamma-clay, and mordenite were used. For the determination of the conversion of HCl to chlorine, titrimetric methods were used. The following mass ratios of active components were used: copper; silver, copper, 4:1:1 and 2:1:1. The same mass ratios were used for Cu:Ag:magnesium, Cu:Ag:cesium, and Cu:Ag:zinc. Copper alone was less catalytically active than in connection with other metals. Particularly through the addition of silver to copper, the catalytic efficiency was increased. An even better HCl conversion was achieved by adding magnesium and cadmium as well as manganese, cesium, and lead as promoters to the Cu-Ag combination. The combination Cu:Ag-promoter in a mass ratio of 4:1:1 was most favorable with the concentration of Cu on the carrier amounting to about 5%. Silical gel of the type B was the best carrier material. The conversion on good catalysts began at about 320 C, and at 400 C 80% of the HCl was converted. At a residence time of 6.24 sec 70 to 75% of the HCl was converted.

27461

APTIC NO. 49595

Yamazaki, Noboru

CHARACTERISTICS OF HEAT - AND CORROSION-RESISTANT KS RESIN, LINING, AND ITS APPLICATION TO GAS SCRUBBING DEVICES. (Tainetsu taishokusei KS jushi rainingu no tokusei to gasu sen-josochi eno oyo ni tsuite). Text in Japanese. Preprint, Japan Welding Assoc., Tokyo, 9p., 1973. (Presented at the Seminar on Plastics Used in Public Nuisance Prevention Devices and their Processing Techniques, Osaka, Japan, Feb. 19-20, 1973.)

A new synthetic plastic is described which features corrosion-, heat-, and thermal shock-resistant characteristics making it suitable for lining gas scrubbers. It is developed from an unsaturated epoxy ester resin through special processes and treatments. Bonding strength, anti-chemical characteristics, heat resistance, hardness, and other characteristics of the new resin are compared favorably with other plastic linings. Applications of the new lining material to wet and dry desulfurization devices and stack gas disposal devices are discussed.

27462

APTIC NO. 49161

Zechnall, Richard and Guenther Baumann

CLEAN EXHAUST GAS FROM OTTO ENGINES THROUGH CLOSED CONTROL LOOP. (Reines Abgas bei Otto-Motoren durch geschlossenen Regelkreis). Text in German. Motortech. Z. (Stuttgart), 34(1):7-11, 1973. 33 refs.

The more stringent limit values which will go into effect soon concerning the exhaust gas emissions from Otto engines cannot be met without the use of catalysts, particularly if the oxides of nitrogen are to be reduced too. Operation with a rich mixture plus catalysts will increase the fuel consumption and will place an undesired thermal burden on the catalysts. Operation with a lean mixture plus catalysts will lower the driving properties. Advantages are expected upon operation of the engine with an exactly stoichiometric fuel to air mixture. The desired accuracy, however, cannot be achieved with the conventional method of mixture preparation. Therefore a control loop with exhaust gas probe was developed. It measures the oxygen concentration of the exhaust gas and regulates the fuel injection if the fuel to air mixture deviates from the

stoichiometric ratio. The probe comprises a small tube of zirconium oxide which is equipped with gas-permeable platinum electrodes. The ceramic material of the probe doped with certain metal oxides becomes conductive for oxygen ions at higher temperatures. At different partial pressure of the oxygen on the two ends of the probes, an electric voltage is produced which is proportional to the logarithm of the ratio of the oxygen partial pressures. The probe is installed in the exhaust gas duct so that the external wall is surrounded by the exhaust gas and the inner section is in contact with the external air. Since the partial pressure of the oxygen in the free atmosphere is known, the voltage at the probe is a direct measure of the partial pressure of the oxygen in the exhaust gas and thus of the fuel/air ratio lambda. The control loop can be used for both the operation with a single catalyst, as well as with two catalysts. The fuel consumption is only negligibly higher. What is not known yet is the effect of the control loop on the lifetime of the one or two catalysts in use.

1972

27463

APTIC NO. 49074

Ministry of International Trade and Industry (Japan), Bureau of Heavy Industries

DATA ON THE INSPECTION STANDARDS FOR DUST COLLECTION EQUIPMENT. (APPENDIX). (Kogai boshi shujin sochi no kensa kijun fuzoku shiryō). Text in Japanese. 32p., Oct. 1972.

Examples for the calculation of dust concentrations by the JIS Z 8808 method are given, and the factors which determine the characteristics of a dust collector are described. Investigations were conducted at 25 major suppliers of dust collectors. The dust collectors were used in various industries including food, fiber, and paper manufacture. Over 50% of the dust collectors reached their stable period in 1 week and only 9.5% were over 3 months. The time to reach the stable period for a dry-type dust collector was 1 to 3 months, whereas that for a wet-type dust collector depended on whether it was a washing type or electric type.

27464

APTIC NO. 49080

PULP FROM SWAZILAND: 12-MILLION-POUND INVESTMENT IN THE FUTURE. Paper, 1(9):521-522, 524, 527, 529, 539, Oct. 4, 1972.

A unique example of the practical application of tropical forestry to modern pulp technology is provided by an unbleached kraft pulp mill in Swaziland in southern Africa. About 110,000 acres of the company's estate have been planted with pine trees. The pulpwood contains a uniquely high proportion of spring wood, which results in paper with the relatively high breaking length and bursting strength characteristic of some North American pulps. The trees grow rapidly and are felled when they are 12-14 yrs old. The pulping process is conventional for an unbleached kraft mill up to the flash drying section. Here the disintegration and drying stages are combined to effect optimum fiber separation. Virtually all the fibers are free after drying in a dryer that works in much the same way as machines which grind coal for pulverized fuel boilers. The latest electrostatic collecting equipment has been installed in recovery boilers to reduce fine emissions; in addition, grit arrestors on the bark boiler have been rebuilt to be more efficient. Pulp production in 1971 was 105,505 tons.

27465

APTIC NO. 49121

Japan Automobile Technical Assoc., Tokyo

THE ABATEMENT OF AUTOMOTIVE EXHAUST GASES. (Jidosha haishutsu gasu teigen ni tsuite). Text in Japanese. Preprint, 19p., June 1972. 6 refs.

The development of methods for the abatement of automotive exhaust gas was engaged with concentration on the improvements of the purifying apparatus for the oxidation catalyst, the

exhaust reactor, the exhaust gas recycling equipment, and the purifying apparatus for reducing catalyst. Other factors which have also been studied include improvements of the combustion chamber, caburetor, ignition equipment, and prevention of evaporation. Research and development are being conducted on alternative engines such as gas turbines, steam engines, and electric automobiles. The carbon monoxide, hydrocarbon, and nitrogen oxide concentrations in automotive exhaust gas are expected to decrease significantly in 1976 due to the strict regulation.

27466

APTIC NO. 49122

Mitsubishi Heavy Industries, Ltd. (Japan)

THE PROBLEM OF NITROGEN OXIDES AT NITRIC ACID PLANTS. (Shosan puranto ni okeru NOx mondai). Text in Japanese. Preprint, 12p., June 1972.

Statistics of 1967 in the U. S. showed that about 1% of the total nitrogen oxide emissions resulted from the exhaust gas of nitric acid plants. Untreated flue gas contains as much as 3000 ppm of NOx, with approximately equal amount of nitric oxide and nitrogen dioxide. It is desirable in most cases that the NOx concentration be decreased to about 0.1%. Methods for its treatment including catalytic reduction, non-selective reduction, selective catalytic reduction, alkaline solution washing, and molecular sieve adsorption.

27467

APTIC NO. 49167

Central Council for Pollution Countermeasures (Japan), Planning Committee

A PROGRESS REPORT ON A LONG-TERM VIEW OF ENVIRONMENTAL PROTECTION. REFERENCE DATA. (Kankyo hozen choki bijon chukan hokoku, Sanko shiryō). Text in Japanese. Tokyo, Japan, 113p., 1972 (?).

A long-term view of environmental protection is examined from the standpoint of the future economic development, the desires of the people concerning their environment, the direction of systems dynamics, technical development potentials in the field of environmental protection, and the future environmental capacity. The present desirable environmental standard index demanded by the people of Japan is five or six; but the medial index of people's demands for 1986 will be lowered to 3.38. The demands for sulfur oxides concentration in residential areas in 1985 will be down to 0.024 ppm instead of the present overall environmental standard of 0.04 ppm. The people's demand for SOx concentrations in industrial areas will be 0.037 ppm (medial index). The sulfur content in imported crude oil dropped from 2.05 wt% to 1.59 wt% between 1965 and 1970. The supply plans of fuel oil for 1973 indicates that the sulfur content in fuel oil for this year will be 1.48%. It will be extremely difficult to lower it to less than 1%. The technical progress anticipated in the future for the direct desulfurization method will involve the development of catalysts resistant to fuel metal compounds and asphaltene, with the desulfurization rate of 70 to 80%. Also, the suspension bed instead of fixed beds will be developed gradually, which will make continuous desulfurization possible and lower the cost to approximately \$3.3/k l of crude oil. The indirect desulfurization method will be used in combustion with gasification. Desulfurization of stack gas is still in the initial stage, although its technical development has been completed. In 1973, only 2.7% of the total oil supply will be desulfurized in the stack gas stage.

27468

APTIC NO. 49280

Mitsui Aluminum Engineering Co. (Japan)

INSTALLATION OF THE WET METHOD CHEMICO PROCESS STACK GAS DESULFURIZATION SYSTEM. (Haiei datsuryu kemiko purosasu (shssshiki) setsubi johō). Text in Japanese. Preprint, 5p., Aug. 1972.

AIR POLLUTION ABSTRACTS, JUNE 1973

The Wet Chemico process apparatus consists of two scrubbers of 385,000 N cu m/hr each (entrance pressure 450 mm Aq, exit pressure 40 mm Aq), one breeder, two boost-up fans of 1000 KW each, one re-heat furnace of 550 l/hr using C heavy oil as fuel, six circulating pumps of 200-240 KW, one slurry tank, two control compressors, one sulfur dioxide meter with the conductivity method for the electric precipitator, and one SO2 meter with the infrared method for the stack. Carbide is used as an absorbent at excess amounts below 120%. The apparatus is guaranteed of more than 90% desulfurization and dust collection. Inspection by the Ministry of International Trade and Industries showed a K value of 8.2, dust concentration below 0.2 g/N cu m, and more than 90% desulfurization at a load of 156,000 KW.

27469

APTIC NO. 49306

EXTENSION AND MODERNIZATION OF ASSI MILLS.

Svensk Papperstid (Stockholm), 75(21):875-879, Nov. 30, 1972.

An \$81 million expansion and modernization program at two Swedish kraft mills included an expenditure of about \$6 million on antipollution measures. New installations at one mill include a second liner board machine for doubling kraft liner production; a dry barking drum for the pulp mill woodroom; a continuous digester for high-pressure impregnation of chips and two continuous diffusers; a recovery boiler with a combustion capacity of 1300 tons of dry substance/24 hours; and two-stage venturi scrubbers for old and new lime kilns. Both the new and old recovery boiler have a steam capacity of 160 t/hr; the steam is used for power production in turbo-generators. Odorous gases and final combustion gases from a destruction furnace are burned in the old recovery boiler, which was converted to oil firing. The venturi scrubbers reduce the dust content of kiln flue gases to below 200 mg/cu nm. In the paper mill, the heat exchange system for dryer hoods utilizes the heat of exhaust air instead of the incoming air. The heated water is then pumped to various points and used to heat fresh air. Recent installations at the second mill, which produces bleached and unbleached kraft paper and bleached sulfate pulp, include a drum barker, and advanced lime kiln, a flash dryer, new sedimentation tanks, and a special distillation column for removal of odorous gases, which are then burned in the lime kiln.

27470

APTIC NO. 49338

TRW, Inc., McLean, Va., Transportation and Environmental Operations

PREDICTION OF THE EFFECTS OF TRANSPORTATION CONTROLS ON AIR QUALITY IN MAJOR METROPOLITAN AREAS. Office of Air Programs Contract 68-02-0048, Task 6, Pub-APTD-1393, 130p. Nov. 1972. 9 refs.

NTIS: PB 214176

Transportation controls in the reduction of motor vehicle emissions and the impact of the expected emission reductions on air quality in the metropolitan areas of Chicago, New York City, Denver, San Francisco, Los Angeles, and Washington, D. C. were evaluated. Emission rates and predicted concentration levels were assessed for each of the defined transportation control conditions, including inspection and maintenance; traffic flow controls; and motor vehicle constraints. The major pollutants considered were carbon monoxide, hydrocarbons, and nitrogen oxides. Meteorological data on wind speed and direction and stability factors were plugged into the Gifford-Hanna dispersion model. The general analytic methodology and complete data specific to each urban area are presented.

27471

APTIC NO. 49357

Bendix Corp., Southfield, Mich., Research Labs.

CONTROL OF NOX EMISSIONS FROM MOBILE SOURCES. (FINAL REPORT). Office of Air Programs

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Contract EHS 70-122, Proj. 2872, Rept. 6213, APTD-1278, 176p., April 1972. 5 refs.

NTIS: PB 211376

Reduction of nitrogen oxide emissions from a 4000-pound vehicle by extending the operation of the engine in the ultra-lean air/fuel regime was investigated. The program consisted of a baseline vehicle evaluation with a carburetor, installation of Electronic Fuel Injection (EFI), baseline evaluation with EFI, and demonstration of present capability regarding NO_x mass emissions. The second phase of the program consisted of removing the engine from the vehicle and installing it on an engine dynamometer, performing steady-state tests at selected power test points, and exploring the possible ultra-lean operation using various parameters. The investigations performed under this program were concentrated at air-fuel ratios of 18:1 and higher. The effect of the following parameters was explored: air management, timed sequential injection, spark plug gap, spark duration and energy, intake air heating, inlet air temperature, and intake valve throttling. The potential of reducing NO_x emissions with ultra-lean mixtures was seen clearly. However, ultra-lean mixtures are very prone to misfire resulting in increased hydrocarbon emissions and rough engine operation giving poor drivability. But the oxygen-rich exhaust, resulting from lean operation, appeared to offer the possibility of a thermal reactor or a catalyst for oxidizing HC without secondary air.

The Committee on Motor Vehicle Emissions is conducting a many-faceted study of the technological feasibility of meeting the 1975 and 1976 motor vehicle standards. The study of technological feasibility includes an investigation of the anticipated costs to be incurred and the estimated time for the design, development, and mass production of an engine, control system, or device capable of meeting the standards. A series of panels of consultants was formed to deal with emission standards; testing, inspection, and maintenance; emission control systems; driveability; manufacturing and producibility. Extensive information was obtained from a questionnaire sent to all five domestic automobile manufacturers and to all 16 foreign automobile manufacturers exporting a significant number of cars into the United States. Emphasis in this report is on 1975 standards. Proposed 1975 emission control systems which are considered include exhaust gas recycle, secondary air systems, thermal reactors, oxidizing catalytic converters, and major engine modifications. Control system integration, systems compatible with 1976 oxides of nitrogen standard, effects of emission control systems on vehicle performance, and stratified charge and Wankel engines are also considered. Control requirements for NO_x, carbon monoxide, hydrocarbons and evaporative losses are listed.

27472

APTIC NO. 49450

American Society for Metals, Metals Park, Ohio

POLLUTION CONTROL IN METALS INDUSTRIES. FEBRUARY 1967 THROUGH JULY 1972. Bibliography Series B27-33, 30p., 1972. 510 refs.

A bibliography of pollution control in the metals industry was compiled and includes methods of pollution abatement such as treatment of effluents, waste disposal, fume control, dust control, exhaust gas purification, regeneration of solvents, removal of poisonous materials from industrial water, and reclamation practices in the recovery of useful metals from waste. (Author abstract modified)

27475

APTIC NO. 49582

Arras, K.

ELECTROSTATIC PRECIPITATORS FOR DUST REMOVAL FROM CEMENT GRINDING MILLS. (Elektrofilter fuer die Entstaubung von Zementmuehlen). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(12):610-615, 1972.

Electrostatic precipitators provide the necessary operational reliability for removing dust from cement grinding mill stack gas. For stable operation of the precipitator it is necessary to condition the mill exhaust air by means of water injection. As a result of evaporation of water, part of the heat is dissipated, so that the specific air supply rates for cooling the mills can be reduced. At the same time, water injection improves the performance of the mill by obviating the cushioning effect. However, if too much water is used, it could impair the strength of the cement. By using a pre-collector in the inlet to the electrostatic precipitator it is possible to dispense with cyclones for reducing the dust content before the precipitator, so that a simple arrangement for the installation as a whole is obtained. With an injected water quantity of 1%, a temperature of 95 C, and a water dew point of 30 C, the dust concentration is reduced from 250 g/cu m to 0.05 g/cu m. The average specific water quantity, with respect to the mill capacity, is 2.35% with a fluctuating range between 1 and 4.16%.

27473

APTIC NO. 49889

(Inventor not given.)

DEVICE FOR EXHAUST SILENCING AND FOR THE ADDITIONAL OXIDATION AND COMBUSTION OF WASTE GASES FROM INTERNAL COMBUSTION AND SIMILAR DESIGN ENGINES. (Dispositif on appareil pour l'amortissement du bruit, l'oxydation et la combustion additionnelle de gaz d'echappement de moteurs a combustion interne ou similaires). Text in French. (Assignee not given.) French Pat. 2,099,123. 6p., Feb. 14, 1972. (Appl. June 16, 1971, 3 claims).

A device for silencing, additional oxidation, and combustion of exhaust gases especially from internal combustion engines is described. The exhaust cleaning device is composed of a mixing chamber and a combustion chamber where the exhaust-air mixture is ignited by for example electrodes. The exhaust gas admitted tangentially into the mixing chamber is mixed with air while performing rotary motion. The outlet port from the afterburning chamber is modified by a valve as a function of the exhaust flow through the outlet port. The inside of the afterburning chamber and the body of the outlet control valve are coated with a catalytic material.

27476

APTIC NO. 49898

Ashford, Nicholas A. and Frank H. Jarke

ELECTRON PARAMAGNETIC RESONANCE (EPR) INVESTIGATION OF LIMESTONES AND THEIR CALCINES AND CORRELATION WITH REACTIVITY WITH ACID GASES. (FINAL REPORT). IIT Research Inst., Chicago, Ill., Physical Chemistry Section, Environmental Protection Agency Contract 68-02-0208, IIT Rept. IITRI-C624-7 and EPA Rept. EPA-R2-72-019, 69p., Feb. 18, 1972. 13 refs.

NTIS: PB 211504

To assist in the characterization of marls and chalks and to identify properties which account for their high reactivity with sulfur dioxide a selected set of calcined and uncalcined carbonate rock samples was investigated by electron paramagnetic resonance spectroscopy. It was also hoped to establish a semi-quantitative basis for evaluating a crystalline order of limestones to predict their reactivity with acid gases, as well as to determine the effect of altering the calcination temperature on the crystalline structure of calcines. The effects were investigated of slaking on the crystalline parameters of calcines produced at different temperatures in order to support wet limestone scrubbing process development. Using the posi-

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APTIC NO. 49899

National Academy of Sciences-National Research Council, Washington, D. C., Committee on Motor Vehicle Emissions SEMI-ANNUAL REPORT BY THE COMMITTEE ON MOTOR VEHICLE EMISSIONS OF THE NATIONAL ACADEMY OF SCIENCES TO THE ENVIRONMENTAL PROTECTION AGENCY. Environmental Protection Agency Contract 68-01-0402, 85p., Jan. 1, 1972.

tively charged divalent manganese ion as a probe of calcium carbonate crystallinity, the fitting of Mn^{++} EPR linewidth data to the SO_2 reactivity and capacity data resulted in correlation coefficients of 0.55 and 0.49, respectively. No significant EPR linewidth correlation was found for the reactivity and capacity of calcined materials. However, in a calcined series in which the calcination temperature was varied producing variations in density, a good correlation of the EPR linewidths was found with the density data. Hydration of calcined materials produced a hydrated site for Mn^{++} which gave a different and distinguishable EPR spectrum than that for Mn^{++} in unhydrated sites. (Author abstract modified)

27477

APTIC NO. 49989

Ashihara, Kazunori, Tsuguo Abe, Matsuo Kodaka, Juichi Takizawa, Yoshio Sato, and Shinji Moriya

STUDY ON CATALYST TYPE EXHAUST GAS CLEANER (1ST REPORT) - MAIN FACTORS AND PROBLEMS CONCERNING GENERAL PERFORMANCE. (Shokubaishiki haiki seijosochi ni kansuru kenkyu (Dai ippon) - Ippan seino ni kansuru shuyoin to mondaiten). Text in Japanese. Preprint, Ministry of Transportation (Japan), Traffic Safety and Nuisance Research Inst. p. 68-82, 1972. 2 refs. (Presented at the Traffic Safety and Nuisance Research Institute Research Meeting, 2nd, Tokyo, Japan, Nov. 8, 1972.)

Various factors affecting general performance of a catalyst-type exhaust gas cleaner were studied. The factors included the temperature in the catalyst layers during normal operation of the engine, the temperature rise characteristics during the warm-up period, the temperature rise during deceleration, the temperature rise with the ignition failure, the relation between the outer surface temperature of the cleaner and the temperature in the catalyst layers, the exhaust gas pressure, and the purification efficiency under various operating conditions. These problems remain to be solved for catalyst cleaners presently in use or under development: the supply system of secondary air necessary for the reaction; the control system for temperature in the catalyst layers; compatibility between emission characteristics of the engine used and catalyst reaction temperature; unification of views on the operating ranges of the engine and the catalyst; countermeasures for ignition failure or malfunctioning of the engine; and determination of the exhaust gas resistance and the lowest limit of power development. Temperature in the catalyst layers rose to 800-900 C in some cases and was more than 1000 C for others during the engine braking. Ignition failure of one cylinder easily caused the temperature to rise to more than 1000 C. With some cleaners, the exhaust gas resistance was three to five times greater than that of the silencer. The purification efficiency was 90% or higher for carbon monoxide and 50% or higher for hydrocarbons, the latter being greatly affected by ignition timing.

27478

APTIC NO. 49677

Austin, Thomas C.

EXHAUST EMISSIONS FROM A VEHICLE RETROFITTED WITH THE MONOCAR HC CONTROL SYSTEM. Environmental Protection Agency, Office of Air Programs, Rept. 72-24, APTD-1408, 7p., June 1972.

The exhaust emission characteristics of a car retrofitted with a Monocar hydrocarbon control system were studied to determine the effects of the system on driveability and emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. The system was an effective control for reducing exhaust emissions from uncontrolled vehicles with minor fuel consumption penalty. It was not as efficient, however, as the recalibrated carburetors and ignition system. Driveability of the vehicle equipped with the system was not as good as baseline vehicles: increased tendency to stall after start-up was prevalent. The Monocar system is an air bleed device combined with distributor modifications which partially eliminate vacuum advance.

27479

APTIC NO. 49680

Austin, Thomas C.

EXHAUST EMISSIONS FROM THE AUTO-MATE RESEARCH CHEVROLET. Office of Air Programs, Test and Evaluation Branch, Rept. 72-17, APTD-1401, 6p., March 1972.

The exhaust emission characteristics of a car equipped with an air bleed valve, a fuel valve, and an electronic nitrogen oxide control and fueled by gasoline with special fuel additives were studied to determine the effect of the modifications on fuel consumption and emissions of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The vehicle achieved a 31% reduction in unburned hydrocarbons, a 41% reduction in CO, and an 8% increase in NOx emissions with the air bleed and fuel valve operational. Hydrocarbon and CO levels increased when the fuel additives were used. With the fuel valve closed, CO increased and NOx decreased. The electronic NOx device had no beneficial effect on emissions.

27480

APTIC NO. 49682

Austin, Thomas C.

INTERIM REPORT ON EDDE DART. Office of Air Programs, Test and Evaluation Branch, Rept. 72-20, APTD-1404, 4p., April 1972.

The exhaust emission characteristics of a car equipped with a modified induction system were studied to determine the effects of the system on emission levels of hydrocarbons, carbon monoxide, and nitrogen oxides. The main feature of the system was a special intake manifold designed to remove liquid fuel from the intake charge in order to reduce cold start emissions. The hydrocarbon and CO levels achieved by the modified system were more than 80% lower than those from an uncontrolled vehicle. The emission levels, however, did not meet the 1975-1976 standards.

27481

APTIC NO. 49191

Balazs, Laszlo and Geza Udvardi

CURRENT PROBLEMS OF NATURAL GAS SUPPLY MANAGEMENT IN THE ZALA COUNTY GAS SUPPLY DISTRICT. (A teljesitmenygazdalkodás idoszeru kerdesei a zalai gázszolgáltatási körzetben). Text in Hungarian. Energagazdalkodás, 13(12):556-560, 1972. 3 refs.

Annual, seasonal, and monthly variations in the gas demand in the Zala county gas supply district were analyzed to obtain trend for the future consumption. A linear trend function for the increasing gas demand of the last 11 years was obtained. Such trend functions should include at least the last 4, but not more than the last 12 years. Maximum gas consumption in the morning, at noontime, and in the afternoon, while minimum in the night were determined. Gas supply networks should be designed for the afternoon peak in the heating period. Close regression relationships between the outside temperature below the heating threshold and the daily gas consumption were established.

27482

APTIC NO. 49174

Belohradsky, Hanns-Juergen

EXHAUST GAS POLLUTION BY AUTOMOBILES - DISCUSSION OF TECHNICAL AND GOVERNMENTAL MEASURES FOR THE REDUCTION OF POLLUTANT EMISSION BY CONVENTIONAL ENGINES AND A LOOK AT NEW DRIVES. (Abgasbelastung durch Strassenfahrzeuge - Hinweise auf technische und staatliche Massnahmen zur Verminderung der Schadstoffemission durch konventionelle Motoren und Ausblick auf neuartige Antriebe). Text in German. Staub, Reinhaltung Luft, 32(12):478-484, Dec. 1972. 1 ref.

In the Federal Republic of Germany automobile traffic in 1970 caused about 3.9 million tons of carbon monoxide, 500,000 tons of hydrocarbons, 28,000 tons of oxides of nitrogen, 58,000 tons of oxides of sulfur, 50,000 tons of soot, and 6000

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tons of lead compounds. Depending on the concentration of these pollutants in the atmosphere, they affect humans through annoying odors. The rise of heart and lung diseases and of cancer is attributed in part to these pollutants. The formation and emission of pollutants depend on the combustion engine conditions and driving style. Special testing methods are used for investigation and judgement of the emission of pollutants (California Test, European Test, seven-mode Federal test for spark ignition engines). Several pollution control measures for automobiles, emission standards, and factors regarding diesel and spark ignition engines are discussed. It is possible to promote a driving style which gives off less pollutants by road and urban planning. Electric propulsion, hybrid propulsion, and other new types of propulsion systems are being developed.

27483

APTIC NO. 49624

Bignon, M.

SULFUR RECOVERY IN REFINERIES. (*Recuperacion Del Azufre en las refinarias*). Text in Spanish. Ion Madrid, 32(373):473-474, 517, Aug. 1972. (Presented at the Refinerias de Petroleo y Petroquimica Colloquium, Madrid, Spain, April 1972.)

The recovery of sulfur in petroleum refineries is discussed. Desulfurization in petroleum refineries should provide impeccable fuels, control air pollution, and furnish sulfur as a secondary product. These goals can be achieved by utilizing the Claus process. Most of the Claus hydrogen sulfide conversion units include one combustion and two catalytic facilities. Close to 100% sulfur yields can be achieved by maintaining the hydrogen sulfide/sulfur dioxide ratio equal to two. The so-called acid gas, formed during the initial combustion stage, generates carbon dioxide and vapor. A third portion of the acid gas burns to SO₂ and reacts with the other 2/3 of the gas mixture to generate sulfur. The total air supply controls the H₂S/SO₂ ratio. The sulfur is obtained as a liquid which should be subjected to a gas removal treatment to control an eventual trace H₂S contamination which may result hazardous in the transportation of the finished sulfur product. Application of such procedures reduced considerably sulfur air pollution in France during the past four years.

27484

APTIC NO. 49792

Bourgeois, Sidney V., Jr.

TRANSIENT ANALYSIS OF MULTIPLE SOLID-FLUID REACTIONS IN AN ADIABATIC FIXED BED REACTOR: REMOVAL OF SULFUR DIOXIDE FROM FLUE GASES. Louisiana State Univ., Baton Rouge, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., May 1972, 268p. 50 refs.

A complex model capable of simulating the transient, nonadiabatic operation of fixed bed reactors involving multiple solid-fluid reactions was developed. Numerical integration of the resulting differential equations was accomplished by a predictor corrector technique. Analysis of sulfur dioxide removal by absorption from flue gases was performed by utilizing this model. The mathematical model was derived for the irreversible oxidation and sulfation reactions of copper oxide. The unreacted-shrinking-core mechanism described the progress of these reactions within the spherical porous particles which served to pack the bed. The Cu₂O was assumed to be dispersed evenly throughout the pellets. The model consisted of partial differential equations describing the bulk gas phase material balances, solid reactant material balances, and bulk gas phase and pellet gas phase energy balances which incorporate the analytical solution for the pellet gas material balances. The rate of solid reactant consumption was expressed in terms of the rate of shrinkage of the shrinking cores within the particles. The characteristic transformation reduced the original system of partial differential equations to a set of equations with derivatives in each equation occurring in only one direction. Rate controlling factors during transient,

adiabatic operation were the pore diffusion and chemical reaction in the sulfation zone of the particle and the particle thermal conductivity. Reactor performance was strongly influenced by the size of the pellets, inlet flue gas temperature, and initial pellet temperature. Under the proper conditions, removal of SO₂ from flue gases by fixed beds of Cu₂O was feasible. Maximum pellet diameter of 0.25 in., minimum inlet flue gas temperature of 400 C and minimum initial bed temperatures of 440 C should result in breakthrough times of 20 min and temperature rises of 100 C.

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APTIC NO. 49343

Calvert, Seymour, Jhuda Goldshmid, David Leith, and Dilip Mehta

WET SCRUBBER SYSTEM STUDY. VOLUME I. SCRUBBER HANDBOOK. Ambient Purification Technology, Inc., Riverside, Calif., Office of Air Programs Contract CPA-70-95, EPA-R2-72-118a, 916p., July 1972. 1142 refs.

NTIS: PB 213016

A state-of-the art study on scrubbers was constructed to review and assess the status scrubber technology; review and evaluate existing scrubber systems and define current practices in the application of scrubbers to air pollution control; define usage problems; identify potential new applications; and develop specific research recommendations. Types of scrubbers available commercially; scrubber patents; the basic concepts of scrubber operation; design methods; auxiliary instrumentation; scrubber performance on industrial emissions; system analysis, costs, and optimization; data on the physical and chemical variables and materials utilization; and related liquid and solid waste disposal methods are reviewed. Scrubbers include packed tower, plate, fiber bed, spray tower, venturi, centrifugal, baffle, impinger, mechanically aided, and moving bed types.

27486

APTIC NO. 49344

Calvert, Seymour, Jhuda Goldshmid, David Leith, and Dilip Mehta

WET SCRUBBER SYSTEM STUDY. VOLUME II. FINAL REPORT AND BIBLIOGRAPHY. Ambient Purification Technology, Inc., Riverside, Calif., Office of Air Programs Contract CPA-70-95, EPA-R2-72-118b, 178p., July 1972. 1700 refs.

NTIS: PB 213017

The state-of-the-art of wet scrubber technology and applications to air pollution control is examined. The research methodology involved in the study; design methods and criteria for scrubbers; research and development recommendations; and scrubber use and applications are reviewed. A bibliography is also included on areas directly related to scrubber design, operation, and application. Scrubbers studied included plate, packed tower, fiber bed, spray, venturi, centrifugal baffle, impinger, and moving bed.

27487

APTIC NO. 49354

Cambon, M. J., L. D. Fraley, J. J. O'Donnell, and A. G. Sliger
APPLICABILITY OF SO₂-CONTROL PROCESSES TO POWER PLANTS. (FINAL REPORT). Kellogg M. W. Co., Houston, Tex., Research and Engineering Development, Office of Air Programs Contract CPA 70-68, Task 11, Program 1A2013, MWKLG-RED-72-1274, EPA-R2-72-100, 77p., Oct. 15, 1972.

NTIS: PB 213421

Fourteen different, large, oil- and coal-fired power systems were studied to determine the extent to which sulfur dioxide control units could be installed in the power plants. Primary emphasis was on space availability, but cost was also considered. To obtain an indication of installation costs, a qualitative retrofit complexity factor was estimated for each boiler

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unit studied by considering space availability, site assessability, and degree of plant modification. The complexity factor relates the cost of retrofitting a control system to the cost of the same system installed on a new power plant. The distribution of relative operating costs over generating capacity was calculated by assuming that investment is proportional to the complexity factor and by incorporating the effect of the unit load factor. Other applicability factors included in the study were: available space for regeneration facilities, available land for waste disposal, present techniques and costs of fly ash disposal, and the availability and cost of utilities, clean fuels, and other materials. It was concluded that all the utilities contacted would prefer low-sulfur fuel to stack gas clean-up if such fuel were available.

27488

APTIC NO. 49718

Capp, John P. and Leo Makovsky

FLY ASH-RUBBER MIXTURES. STUDIES ON SKID RESISTANCE AND DURABILITY. Bureau of Mines, Morgantown, W. Va., Morgantown Energy Research Center, RI 7619, 14p., 1972. 1 ref.

GPO

Addition of sintered fly ash/bottom ash mixtures to standard rubber formulations was studied regarding its effect on skid resistance and wear performance. Wet skid resistance increased with decrease in particle size and increase in weight of sintered fly ash. Addition of fly ash or bottom ash greatly reduced the wear characteristics of the ash-rubber mixtures. Addition of 15 lbs of fly ash with reduced particle size/100 lbs of rubber did not improve skid resistance sufficiently to warrant its use in tires. Tensile strength and abrasion resistance of tread compounds containing more than 15 lbs of fly ash/100 lbs of rubber were reduced to a degree that rendered them unsuitable for conventional use. Abrasion resistance of compounds as measured in laboratory tests was reduced up to 50% by addition of fly ash. Raw fly ash, which consists of smaller particles, was compounded with rubber in mixtures containing 20, 40 and 60% fly ash, but an 80% fly ash mixture tended to pull apart easily and could not be tested. Cure rate of fly ash rubber increased and curing time decreased with increase in fly ash content, but the wet skid resistance was adversely affected. Fly ash, in sintered or in raw form, thus has little or no value as an antiskid agent in tires, but might prove suitable as a filler in other rubber goods.

27489

APTIC NO. 49359

Chappell, Gilford A.

DEVELOPMENT OF AQUEOUS PROCESSES FOR REMOVING NOX FROM FLUE GASES. Esso Research and Engineering Co., Linden, N. J., Government Research Lab., Environmental Protection Agency Office of Research and Monitoring Contract 68-02-0220, EPA-R2-72-051, Program Element 1A2014, 212p., Sept. 1972. 4 refs.

NTIS: PB 212858

The development of aqueous processes for removing oxides of nitrogen from flue gases is summarized. A screening study was conducted to evaluate the capability of aqueous solutions to scrub NOx from the flue gases emitted by stationary power plants fired with fossil fuels. The apparatus used in the study, including the flue gas blending system and flue gas scrubbers, and the gas and solution analyses carried out are described. Nitrogen oxides were absorbed from flue gases containing no sulfur dioxide by water, metal hydroxides, sulfite slurries, limestone, ammonia and 2-aminoethanol solutions, acidic solutions, and salt solutions. Sulfate formation in sulfite scrubbers, nitrogen dioxide-SO2 absorption by sulfites, and NO2-SO2 absorption by hydroxides and carbonates in scrubbing flue gas containing both NO2 and SO2 are reviewed. All data are listed.

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APTIC NO. 49500

Chihara, Shigeo and Masayoshi Yagigaya

EXPERIMENTS ON PERFORMANCE OF ELECTROSTATIC FLOCKED FILTER. (*Denkishokusen rozai no seino jikken*). Text in Japanese. *Funtai Kogaku Kenkyu Kaishi (J. Res. Assoc. Powder Technol., Japan)*, 9(6):403-406, Nov. 1972. 6 refs.

An electrostatic flocked filter is a large-meshed cloth filter with synthetic fiber naps used in a high-voltage electrostatic field. Long and short synthetic fiber naps are used to provide naps varying in the direction of thickness. Performance of this new filter was compared with that of a non-woven cloth filter; pressure loss and momentary dust collection efficiency were related to rate of filtration; pressure loss was related to deposited dust load; and momentary dust collection efficiency was related to deposited dust load. The test indicated that the electrostatic flocked filter can be easily regenerated while in continuous use with an air filter device. The regenerated filter gave the same performance as a new one. It can be so easily regenerated that it is possible to make the filter device smaller and use automated maintenance. The filter can be used to filter air or gas containing high concentrations of dust.

27491

APTIC NO. 49775

Chone G. and H. Oetting

HOW FAR CAN THE OXIDES OF NITROGEN BE REDUCED WITH RICH MIXTURES? (Wieweit kann man NOx mit reichen Gemischen senken)? Text in German. Preprint, Federation Internationale des Societes d'Ingenieurs des Techniques de l'Automobile, Brussels, Belgium, 2/48-2/53, 1972. (Presented at the Federation Internationale des Societes d'Ingenieurs des Technique Automobile Internationale Congress, London, England, June 25-31, 1972.)

Conventional VW engines were used for experiments with the purpose of reducing the oxides of nitrogen emission by exhaust gas recirculation and ignition timing. The non-stationary tests were run according to the California Method of 1971 and the U. S. test of 1973. The tests with lambda higher than 1.1 showed that even with 25% of the exhausts recirculated, the oxides of nitrogen concentration could not be reduced to less than 10% of the 1971 limits. With a fuel to air ratio of lambda equal to one, it was feasible to reduce the concentrations to less than 10% of the 1971 limits provided 20 to 25% of the exhausts were returned and the ignition advanced by up to 10 deg BTDC. As a consequence, the fuel consumption rose by 33% and the medium pressure dropped by 25%. The required modifications would exceed those for the catalytic NO reduction. A reduction of the oxides of nitrogen emission to 40% of the 1971 limits would raise the fuel consumption only by 5% without necessitating any changes of the ignition system and with 10 to 15% of the exhausts returned. The carbon monoxide values and hydrocarbon would remain constant.

27492

APTIC NO. 49445

Dearth, James D., Lawrence B. Evans, and Edwin R. Gilliland

CYCLIC OPERATION OF PLATE COLUMNS FOR GAS-LIQUID CONTACTING. Massachusetts Inst. of Tech., Cambridge, Dept. of Chemical Engineering, Environmental Protection Agency Contract 68-02-0018, Task 2, EPA-R2-72-023, 70p., May 1, 1972. 24 refs.

NTIS: PB 211853

Based on experimental and theoretical evidence of the possibility to improve the efficiency and capacity of gas-liquid contacting equipment by controlled-cycling of gas and liquid flows, further studies in this direction were undertaken. Difficulties encountered in the design of large-scale systems, where hydraulic instabilities and axial liquid mixing effects are severe, have prevented wide-scale application of such systems in industrial separations. A proposed program for obtaining needed information on tray hydraulics and liquid mixing is

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described, and some initial data and tentative conclusions for both steady-state and cyclic flows of an air-water system in a three-tray section of a cyclic absorber are summarized. Fluctuations in liquid heads and interstage pressure differences; entrainment of small air bubbles in the downflowing liquid; and weepage of liquid due to liquid sloshing in the gas flow period have a pronounced effect upon column hydraulics.

27493

APTIC NO. 49340

Deurbrouck, A. W.

SULFUR REDUCTION POTENTIAL OF THE COALS OF THE UNITED STATES. Bureau of Mines, Pittsburgh, Pa., Pittsburgh Energy Research Center, Office of Air Programs APTD-1365, RI 7633, 298p., 1972.

NTIS: PB 210949 (microfiche only)

The results of a washability study of 322 coal mine samples showing the sulfur forms and distribution in the coals. The samples were collected from mines which were principally utility coal producers. The total sulfur content of the coals evaluated could be significantly reduced by some combination of stage crushing and specific gravity separation. However, few coals could be upgraded to a final product containing 1% or less total sulfur. The complete washability data are presented for each sample processed. A statistical evaluation is included for the coalbeds from which more than 10 samples were collected and for the geographical coal producing regions. A graphical summation is presented for the coal producing regions and selected coalbeds. The washability computer program is also described, along with the statistical evaluation computer program.

27494

APTIC NO. 49335

Doty, D. M., R. H. Snow, and H. G. Reilich

INVESTIGATION OF ODOR CONTROL IN THE RENDERING INDUSTRY. Fats and Proteins Research Foundation, Inc., Des Plaines, Ill., Environmental Protection Agency, Office of Research and Monitoring Contract 68-02-0260, Program element 1A2015, Proj. C8210, EPA-R2-72-088, 150p., Oct. 1972. 70 refs.

NTIS: PB 213386

The control of rendering plant odors was investigated. The cost and design of various control equipment is reviewed, including: direct-fired incinerators, catalytic bed afterburners, equipment for carbon bed adsorption, countercurrent packed tower gas scrubbers, and horizontal spray scrubbers. The design studies indicated that scrubbers are the most economical method, and a commercially available spray scrubber system was calculated to be 1/4 as costly as other methods. The compounds responsible for rendering odors were identified by gas chromatography, mass spectroscopy, and odor panel tests, and included sulfur compounds, amines, and benzene. Exploratory bubbler tests were done with scrubbing reagents, and the most promising were tested in a packed scrubbing column of pilot size. Strong oxidizers, especially sodium hypochlorite, were the most effective on a wide spectrum of compounds. Water was effective on soluble odorants, while alkalines were not very effective. Further tests on a two-stage scrubber system were suggested to be conducted in a rendering plant.

27495

APTIC NO. 49820

Draemel, Dean C.

REGENERATION CHEMISTRY OF SODIUM BASED DOUBLE ALKALI SCRUBBING PROCESS. Environmental Protection Agency, Research Triangle Park, N. C., Div. of Control Systems, Proj. 21 ACX 38, Program A12013, EPA-R2-72, 45p., Nov. 1972. 12 refs.

The double alkali process has emerged as a promising second generation regenerable sulfur oxides scrubbing process. The process chemistry for a double alkali flow scheme was studied using low concentration (0.01-0.05 M) scrubbing solutions of

sodium and regeneration using both limestone and lime. The reactions of calcium hydroxide, calcium carbonate, and limestone with the aqueous sodium ion, sulfite radical, disulfite radical, and sulfate radical (Na^+ , SO_3 , HSO_3 , SO_4) system were studied. The reactions between CaCO_3 or limestone and the system were dependent on the HSO_3 and SO_3 radical concentration, SO_4 radical concentration (ionic strength), CaCO_3 particle size, and agitation level. Bisulfite neutralization with CaCO_3 or limestone required roughly 2 hours for 90% of the reaction to occur. Calcium carbonate utilization ranged from 90-40% with stoichiometry 1.0 and from 66-40% with stoichiometry 1.5, both at a total initial sulfite ($\text{HSO}_3 + \text{SO}_3$) level of 0.088 M. Lime reacted with sulfate in the presence of limited sulfite up to an equilibrium hydroxide level of roughly 0.14 M OH. The reaction with sulfite was suppressed at higher sulfate levels, which also suppressed the neutralization of bisulfite and the precipitation of sulfite with limestone or lime. (Author conclusions modified)

27496

APTIC NO. 49322

Enke, Christian Gg.

SULPHUR EXTRACTION FROM HEAVY AND LIGHT FUEL OILS. (Die Entschwefelung von schweren und leichten Heizölen). Text in German. Erdöl Kohle (Hamburg), 25(11):671-673, Nov. 1972. 1 ref. (Presented at the DECHEMA-Jahrestagung, Frankfurt, West Germany, June 15-16, 1972.)

The desulfurization of fuel oil can reduce sulfur dioxide emissions. Due to the presence of vanadium and nitrogen compounds, the direct desulfurization of vacuum distillates and deasphalting have special problems. Catalysts and their regeneration play an important part in distillate processing. For the technology of heat exchangers and reactors, more detailed investigations are necessary. In order to reduce the sulfur content in fuel oil to 0.1% by weight, western Europe would need three desulfurization plants, each with a capacity of 2.4 million t/yr. They would cost \$100 million. No desulfurization plants now operate in western Europe. A small plant for 130,000 t/yr is being built by the Shell AG in Sweden. In the United States a limited number are in operation. They are located on the east coast and desulfurize vacuum distillates. The costs for desulfurization of distillates amount to between 1.7 and 6.0 \$/t.

27497

APTIC NO. 49553

Fujii, Toru, Nobuko Tajima, Kenichiro Yoshimura, Kaori Inoue, Keisuke Taguchi, Fujihiko Go, Kenji Oka, Yoshinori Nishikawa, Hiroshi Hatanaka, Yoshio Tsujino, and Kiyoshi Imamura

STUDIES OF AIR POLLUTION DUE TO CAR EXHAUST GAS - (2) INVESTIGATION OF ATMOSPHERIC POLLUTION IN THE TUNNEL UNDER YAO AIRPORT. (Jidosha Haiki ni yoru taiki o sen ni kansuru kenkyu - (2) Chikado ni okeru kukiosen chosa). Text in Japanese. Osaka-fu Kogai Kanshi Senta Chosa-Shitsu Kenkyu Hokoku (Proc. Res. Sect. Osaka Environ. Pollution Control Center), no. 3:51-56, Dec. 1972. 4 refs.

A ventilation system was tested in a tunnel under Yao Airport. The ventilation provided by two fans (600 cu m/min) was ineffective. Repair work was conducted during the first part of 1972. Carbon monoxide levels after the repair work were 7.6 ppm on the average when a west wind blew and 12.1 ppm with a north wind, which were reduced by 15.8 and 13.4 ppm, respectively, from values before the repair. Nitrogen oxides were also reduced. Since accurate measurement of wind velocity was difficult, it was impossible to make an exact comparison, but the average CO and NOx concentrations were considerably reduced.

27498

APTIC NO. 49130

Fujimori, M. and N. Tsutsumi

DUST CONTROL IN THE FIELD OF NON-FERROUS METALLURGY. Preprint, Mining and Metallurgical Inst.

of Japan, Tokyo, and American Inst. of Mining, Metallurgical, and Petroleum Engineers, (Aime) New York, N. Y., 28p., 1972. (Presented at the Mining and Metallurgical Institute of Japan-American Institute of Mining, Metallurgical, and Petroleum Engineers, Joint Meeting, Tokyo, May 24-27, 1972, Paper T III a 4.)

Dust control in the field of non-ferrous metallurgy (refining and smelting) in Japan is discussed. Laws and regulations controlling smoke, flue dust, and suspended particulate emissions from boilers, calcinating, blast, melting, and electric furnaces are outlined. The practical aspects and operating variables of dust, cadmium, lead, and sulfur oxides emissions control in the primary metallurgical industry are reviewed. Processes for treating combustion gases and the control equipment utilized (including venturi scrubbers, cyclones, electrostatic precipitators, bag filters, and air tumblers) in various smelters are described in detail. Nitric oxide and dioxide, dust, lead, cadmium, and zinc concentrations in various Japanese cities are listed. Air and water quality standards are mentioned.

27499

APTIC NO. 49535

Fujiwara, Shigeru and Koichi Akiba

EXHAUST GAS CLEANER. (Haikigasu jokasochi). Text in Japanese. (Hitachi, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-23610. 4p., July 1, 1972. (Appl. Nov. 20, 1970, 1 claim).

An afterburner exhaust gas cleaner featuring an ozone generator is described to ensure effective afterburning even when the engine is idling. In a conventional afterburner, the secondary air is supplied by the air pump and decreases during idling or deceleration since the air pump slows down when the engine operates at a lower speed. The ozone generator produces ozone whenever the intake negative pressure becomes lower than that of idling, thus assuring effective afterburning of carbon monoxide and hydrocarbons even with low rpm and greater negative pressure. When the engine is operated at normal driving speed, a sufficient amount of air is fed into the afterburner for effective combustion, and the ozone generator produces and stores ozone. When the engine revolution slows, it is detected by the negative pressure switch, and ozone is allowed to enter the exhaust pipe.

27500

APTIC NO. 49096

Germerdonk, Rolf

TESTS STUDYING THE THERMAL BREAKDOWN OF NITRIC OXIDE- AND AMINE-CONTAINING GASEOUS EMISSIONS. (Versuche zum thermischen Zersetzen von nitrose- und amin-haltiger Abluft). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 187:110-115, 1972. 19 refs.

Studies into the thermal reduction of nitrogen oxides and amines in waste gases from chemical processes are described. The efficiency of nitric oxide reduction is determined by the reaction rate rather than by the reaction equilibrium. High flame temperature and strongly reductive atmosphere are best for the thermal reduction of NO. A special burner with an annular gap for the admission of auxiliary air and fuel has been developed for the reduction of waste gases containing up to 90% of NOx and amines in concentrations exceeding the explosion limit. With an efficiency of over 99%, the residual NOx and amine contents in the purified gas are not higher than 500 ppm and 20 ppm, respectively. The operating costs are \$6.55/cu m of waste gas.

27501

APTIC NO. 49213

Gieskieng, D. H.

CAPACITOR DISCHARGE IGNITION SYSTEM. Mines Mag. (Denver), 62(12):16-17, Dec. 1972. 4 refs.

Advantages of a new capacitor discharge ignition system are described. The capacitor discharge ignition system includes a transistorized power supply, which quickly recharges the 1.5 mfd pulse condenser to about 400 volts. The coil flux rises ex-

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remely rapidly, inducing about 45 KV in the secondary, making a 0.045 inch spark gap feasible. The spark duration is 0.00027 sec. A recent development in capacitor discharge ignition is the incorporation of a speed sensitive network producing additional sparks, which is of particular benefit to newer cars, since the smog control devices commonly cause regions of poor carburetion and ignitability at low speeds. The capacitor discharge ignition leads to reduction of the amount of fuel and oil consumed per mile of travel, which constitutes a potential air pollution reduction.

27502

APTIC NO. 49511

Gloger, Josef and Siegfried Hanke

THE INFLUENCE OF THE DUST LOAD AND THE TYPE OF DUST ON THE COLLECTION EFFICIENCY AND PRESSURE LOSS OF CYCLONE COLLECTORS. (Der Einfluss der Staubbeldung und der Staubart auf den Abscheidegrad und Druckverlust von Zyklonabscheidern). Text in German. Freiburger Forschungsh. A, no. 518:147-168, 1972. 18 refs.

The collection efficiency of an experimental cyclone was tested under various operating conditions and with various kinds of dusts. The processes taking place during centrifugal separation cannot be fully interpreted with existing theories. The three dimensional flow process and the properties of the dust-air mixture cannot be easily described mathematically. The particle movement is not strictly determined but is subject to stochastic influences. All particles which should be theoretically collected can practically leave the cyclone via the gas exit tube with a certain probability. The collection efficiency of cyclones approaches a limit value at entrance speeds above 20 m/sec. At a dust load of about 15 g/cu m, the collection efficiency is at a minimum. The pressure loss of the cyclone increases with the entrance velocity and drops with increasing dust load. For the various kinds of dust, the results of the experiments were similar as quality goes.

27503

APTIC NO. 49632

Gompf, Henry L.

EXHAUST EMISSIONS FROM FOUR GENERAL MOTORS LOW EMISSION PROTOTYPE VEHICLES. Office of Air Programs, Test and Evaluation Branch, Rept. 72-23, APTD-1407, 7p., April 1972.

The exhaust emission characteristics of four prototype vehicles equipped with exhaust gas recirculation, oxidizing catalytic reactors, reducing catalytic reactors, and air pumps were studied to determine the effects of the modifications on emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. Three of the vehicles demonstrated emission levels approaching those required to meet the 1975 standards, with one achieving 1976 levels in one test.

27504

APTIC NO. 49633

Gompf, Henry L.

EVALUATION OF NASA THERMAL REACTOR. Office of Air Programs, Test and Evaluation Branch, Rept. 72-21, APTD-1405, 3p., April 1972.

The exhaust emission characteristics of a car equipped with a thermal reactor were studied to determine the effect of the system on engine performance and emissions of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. None of the emission results approached 1975-1976 required levels, but relatively low levels of hydrocarbons and NOx were achieved; control of CO was minimal.

27505

APTIC NO. 49634

Gompf, Henry L.

EVALUATION OF A GM 1976 PROTOTYPE VEHICLE - A CATALYTIC EXHAUST MANIFOLD SYSTEM. Office of Air Programs, Test and Evaluation Branch, Rept. 72-25, APTD-1409, 8p., June 1972.

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The exhaust emission characteristics of a prototype vehicle equipped with a catalytic exhaust manifold system were studied to determine emissions of carbon dioxide, hydrocarbons, carbon monoxide, and nitrogen oxides. The system contained a quick heat intake manifold, a metal catalyst for the oxidation of hydrocarbons and CO, a metal catalyst for the reduction of NOx, and an air pump. The prototype vehicle showed excellent potential for meeting federal emission standards for 1975-1976 with minimal deterioration of fuel economy and driveability; input of durability mileage data was lacking, however, for full assessment of emission reduction potential.

27586

APTIC NO. 49678

Gompf, Henry L.

EVALUATION OF THE LANDRUM RETROFIT SYSTEM. Office of Air Programs, Test and Evaluation Branch, Rept. 72-22, APTD-1406, Sp., April 1972.

The exhaust emission characteristics of a car equipped with the Landrum retrofit system were studied to determine the effect of the modifications on engine operation and emissions of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The Landrum system employs the replacement of stock idle mixture screws with hollow bleed-type screws. The system reduced hydrocarbon levels by 10% and CO by 15%. A 7% fuel consumption penalty, however, was associated with the system. The tendency to deposit plugging could also result in rough idle, stalling, or misfire.

27587

APTIC NO. 49683

Gompf, Henry L.

EVALUATION OF ECCONO-NEEDLES. Office of Air Programs, Test and Evaluation Branch, Rept. 72-19, APTD-1403, 6p., April 1972.

The exhaust emission characteristics of three cars equipped with an Econo-Needles system were studied to determine the effects of the modified system on fuel consumption and emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. Econo-Needles replace the stock idle mixture screws from the car carburetor with the intended effect of leaning air/fuel ratio. With careful combustion analyzer setting of Econo-Needles, hydrocarbon and CO levels decreased; NOx levels tended to increase. Fuel consumption results were mixed and, therefore, indeterminate.

27588

APTIC NO. 49684

Gompf, Henry L.

EVALUATION OF STA-POWER FUEL ADDITIVE. Office of Air Programs, Test and Evaluation Branch, Rept. 72-16, APTD-1400, 5p., Feb. 1972.

The exhaust emission characteristics of a car fueled by a gasoline-Sta-Power fuel additive mixture were tested to determine the effect of the fuel additive on emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. Tested at various operating cycles, the fuel additive had no immediate chemical or combustion effect on exhaust emission levels.

27589

APTIC NO. 49688

Hauser, Oscar

WASTE GAS AND WASTE WATER CLEANING AFTER A CLOSED CARBIDE FURNACE. (Abgas- und Abwasser-aufbereitung nach einem geschlossenen Karbidofen). Text in German. Preprint, 4p., 1972. (Presented at the Waste Water Conference, Villars-sur-Ollon, Switzerland, May 25, 1972.)

The uncleaned waste gas from a closed carbide furnace contains about 80 to 100 g dust/cu m. It must be cleaned even if the dust is not returned for further use but burned in a flare. The electrostatic precipitator was too space consuming, therefore a scrubber was selected for cleaning the 400 cu m gas produced per ton of carbide. The scrubbing unit comprises a

wetting chamber and two spray scrubbers. The gas is cleaned by this unit to a residual dust concentration of 3 to 5 mg/cu m. The waste gas plume leaving the scrubber is colorless. In one case the cleaned gas is used for the operation of a lime furnace. The cleaning of the waste water from the scrubbing process is also discussed. The sludge from the sedimentation basins of the water purification process contains 60 to 80% water and 22 to 33 gamma CN/g sludge referred to the dry substance. A special dump site was found for the safe disposal of this sludge.

27510

APTIC NO. 49539

Hayashi, Hiroshi

AUTOMATIC TEMPERATURE CONTROL DEVICE OF A CATALYST REACTOR IN AN EXHAUST GAS CLEANER. (Haikigassujokasochi ni okeru shokubaihan-noki ondo jidoseigyosochi). Text in Japanese. (Japan Automobile Research Inst., Tokyo (Japan)) Japan. Pat. Sho 47-23609. 2p., July 1, 1972. (Appl. Nov. 10, 1970, 1 claim).

An automatic temperature control device is described for use in a catalytic reactor to quickly warm the catalyst to the reaction temperature and to activate the cooling system when the catalyst overheats. When the engine is started, the heater is turned on and necessary amount of secondary air for the after-burning of exhaust gas is automatically supplied through an air pipe from the air pump. Excess air is allowed to leave through an electromagnetic valve so that only the necessary amount of air enters the reactor. When the temperature rises, the air is mixed with the exhaust gas. Excess air in the exhaust gas cools the catalyst to avoid overheating.

27511

APTIC NO. 49497

Hinuma, Yutaka

RECENT HEAVY OIL DESULFURIZATION PROCESSES. (Saikin no juyu datsuryu purosusu). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 7(6):237-247, Nov. 1972. 6 refs.

The Low Sulfurization Countermeasure Division of the General Energy Investigation Council of Japan recommended an average sulfur content of fuels in urban areas of 0.9% by 1973 and 0.55% by 1978. Desulfurization processes of heavy oils are classified into direct and indirect methods. Direct methods hydrogenate a residual oil by catalysts; the sulfur content can be reduced to approximately 1%. A majority of plants in Japan are run by indirect methods, which are of less desulfurization efficiency than direct methods. Direct methods have much to be desired in life expectancy of catalysts, production costs, and reliability of operating equipment. Several newly developed desulfurization methods include Gulf HDS Type III Process, Gulf HDS Type III combined with Vacuum Gas Oil (VGO) Gulfing Process, Gulf HDS Type III and Gulf FCC and Light Catalytic Cycle Oil (LCCO) Desulfurization Process, Residfining Process, and Flexicoking Process combined with GO-Fining Process. Costs are cited.

27512

APTIC NO. 49248

Hishida, Kazuo, Hisao Nihei, Kenji Ikeda, Kazuo Morita, and Kimio Kubota

THE RESULTS OF EFFICIENCY TESTS GIVEN TO VARIOUS CATALYTIC CONVERTERS. (Shokubai-shiki sainensho sochi no shiken kekka ni suite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 325. (Nov. 7-9, Paper 272.)

The results of the performance tests given to eight catalytic converters between April and July, 1972 by the Tokyo Metropolitan Government are presented. Each type of equipment was installed in three test cars, and the measurements of carbon monoxide, hydrocarbons, and nitrogen oxide were taken at 0 km, 2000 km, 6000 km, and 10,000 km driving on a dynamometer after 70% of city driving. The measurements

were taken after the 80 km road speed, 10 minutes later, and after 20 min of idling. Measurements of four-mode operation conditions were taken by the Japan Industrial Standard methods. In addition to the minimum of 50% reduction rate (average of three cars), the catalyst weight reduction was taken into consideration. Of the eight converters, the CO average square area reduction rate ranged from 32.2 to 95% and the HC average reduction rate ranged from 27.7 to 76.2%. The weight reduction rate of the best performing converter was 7.5%. Most catalysts used alumina pellets as a carrier, mixed with platinum, manganese, palladium, chromium, or cobalt.

27513

APTIC NO. 49784

Hollinden, Gerald A. and Norman Kaplan

STATUS OF APPLICATION OF LIME-LIMESTONE WET SCRUBBING PROCESS TO POWER PLANTS. *Preprint, American Inst. of Chemical Engineers, New York, 21p., 1972. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 65th, New York, Nov. 26-30, 1972.)*

The status of the application of lime-limestone wet scrubbing processes for the removal of sulfur dioxide from power plants is reviewed. Eleven utilities are currently committed to full-scale installation of lime-limestone SO₂ removal systems; the current and future design considerations of these utilities and investment and operating costs are reviewed. The total effort involves approximately 3800 MW generating capacity. The major problem areas include boiler foiling, scrubber scaling, plugging, erosion, corrosion, solids carryover, and waste disposal. (Author abstract modified)

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APTIC NO. 49414

Hornke, Ruediger

DEVELOPMENTS IN THE REMOVAL OF SULFITE PULP DIGESTION GENERATED WASTE WATERS AND GASEOUS EFFLUENTS. TECHNOLOGICAL AND ECONOMIC CONSIDERATIONS. (*Die Entwicklung der Beseitigung der Kocherei-Abwasser und Abgase von Sulfitzellstoffabriken - technologisch und wirtschaftlich betrachtet*). Text in German. *Wochenbl. Papierfabr.*, 100(23/24):895-898, 900, Dec. 1972, 6 refs.

The Babcock, Lenzing, and Copeland processes for the treatment of sulfite pulp liquor are described. The Babcock process provides combustion of the spent liquor with a dry content of 55-56% in the presence of air in a temperature range of 1250-1300 C. The magnesia present in the flue gas is separated by electrostatic precipitator or multicyclone in dry process. After the waste gas passes a cooling tower where it is cooled from 200 to 65-70 C, it is sent into an absorber usually composed of three series venturi scrubbers where sulfur dioxide is absorbed by magnesium hydroxide. The Lenzing process provides complete combustion in a counter-flow of the spent liquor. The flue gases pass through a wet scrubber where magnesia and ash are separated, and the gas is cooled to 67 C. Sulfur dioxide is absorbed by magnesium hydrate, providing a final SO₂ concentration of 0.01-0.02% by volume. The Copeland process applies a fluidized-bed reactor for the incineration of the spent liquor with a dry content of 40-42% in a temperature range of 1000-1100 C. The waste gases pass through a cyclone, a heat recovery unit, and a special, plastic ball-filled absorber where SO₂ is absorbed by magnesium hydroxide.

27515

APTIC NO. 49091

Hulisz, Stanislaw, Krystina Dudzinska, and Ludwik Kosowicz. DESULFURIZATION OF PETROLEUM COKE. (*Desulfurizacija petroloksa*). Text in Croatian. *Nafta Broj*, 23(12):582-592, Dec. 1972, 28 refs.

Desulfurization of petroleum coke and the results of a series of laboratory tests are discussed. Good results were obtained when the petroleum coke was desulfurized by calcination in

the electric furnace at temperatures of 1500 C. Satisfactory results were also achieved in the long-term calcination process in the cupola furnace at temperatures of about 1300 C. Burning of coke with the additives of sodium carbonate, ammonium chloride, and sodium hydroxide did not give the required results. A negative result was also obtained in the thermal treatment process in the atmosphere of coke gas in the conditions of coking hard coal.

27516

APTIC NO. 49066

Idemura, Hideo

CHIYODA THOROUGHbred 101 FLUE GAS DESULFURIZATION PROCESS. *Chem. Econ. Eng. Rev.*, 4(12):23-29, Dec. 1972, 1 ref.

The basic requirements for a flue gas desulfurization plant are low construction and operating costs, continuous operation, and safety and ease of operation. Pilot plants were constructed to test a flue gas desulfurization process and to meet all the requirements for efficient operation. The process chemistry and design, operating variables, costs, and applications are examined. Dilute sulfuric acid was used as an absorption solvent for sulfur dioxide. The SO₂ gas absorbed was turned into H₂SO₄ through the action of an oxidizing catalyst and oxygen in the air. The acid was reacted with limestone to form gypsum which was separated as a by-product. The exhaust gas contained burned flue gas and carbon dioxide; dust and soot from heavy fuel oil flue gas were discharged with the gypsum or were separated through filtration. The process is applicable to coal-fired boilers and in the treatment of Claus tail gas and smelter gas.

27517

APTIC NO. 49973

Jain, K. K., E. L. Calvin, and R. L. Looper

STATE OF THE ART FOR CONTROLLING NO_x EMISSIONS. PART I. UTILITY BOILERS. *Catalytic, Inc., Charlotte, N. C., EPA Office of Research and Monitoring, Contract 68-02-0241, Task 2, EPA-R2-72-072a, Program Element 1A2014, 117p., Sept. 1972, 94 refs.*

NTIS: PB 213297

Electric utilities cause 19.4% of total nitrogen oxides emissions in the U. S. from all sources. Because of the ease and quickness of adaptability and lower cost, combustion modification is more viable than flue gas treatment in controlling boiler NO_x emissions. Boiler load reduction reduces NO_x effectively in gas and oil-fired boilers and has been demonstrated in some coal-fired boilers, but has the disadvantage of derating the boiler. Low excess air firing reduces NO_x and improves boiler performance. The combination of low excess air and load reduction results in lower NO_x emissions than either technique alone. The offstoichiometric firing and two-stage firing accomplished by firing some burners fuel rich and other on air alone or air rich reduce NO_x up to 72% in gas-fired boilers and 50-60% in oil- and coal-fired boilers. The combination of two-stage combustion, low excess air, and load reduction reduces NO_x levels up to 90% and enables most gas-fired boilers to meet Environmental Protection Agency limits of 0.2 lb NO_x/million Btu. Other techniques reported effective in NO_x reduction are flue gas recirculation, water or steam injection, fuel substitution, and combustion equipment design modifications. The cost of combustion modifications varies with the fuel burned. The two-stage firing effected by overfire ports costs from \$0.15-0.25 for gas and coal-fired boilers, while complete design change costs up to \$3.30/kw. The cost of flue gas recirculation for a 600 mw oil, gas-, or coal-fired plant is \$1.65, \$2.65, and \$3.50/KW, respectively. (Author summary modified)

27518

APTIC NO. 49497

Jotaki, Tomosada, Yuji Tomita, and Kouichi Yoshida

EFFICIENCIES OF CYCLONE DUST COLLECTORS. (*Saikuronbunriki no bunrikoka*). Text in Japanese. *Funtai*

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Kogaku Kenkyu Kaishi (J. Res. Assoc. Powder Technol., Japan), 9(6):415-417, Nov. 1972. 5 refs.

Dust particle size affects cyclone dust collecting efficiency. A formula is developed to calculate the efficiency, assuming that the particle size distribution is of the Rosin-Rammler distribution pattern. A formula relating distance from the outer tube to minimum separable dust size is presented. Particle size, particle shape, and cyclone operating conditions determine the constants A and K. The formula was compared with actual laboratory measurements; high validity was found.

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APTIC NO. 49514

Jotaki, Tomosada, Yuji Tomita, and Kouichi Yoshida

PRESSURE DROP OF CYCLONE DUST COLLECTOR - THE PRESSURE DROP WITH AIR ONLY. (Saikuron-bunriki no atsuryokusonshitsu ni tsuite - Kuki nomi no atsuryokusonshitsu ni tsuite). Text in Japanese. Funtai Kogaku Kenkyu Kaishi (J. Res. Assoc. Powder Technol., Japan), 9(6):363-370, Nov. 1972. 12 refs.

The pressure drop of a cyclone dust collector is proportional to 1.8-2.3 involution of the cyclone's entrance velocity; this index varies with each cyclone so it is difficult to obtain the theoretical index for general application. Using the average velocity of the axial flow direction whose distribution does not vary too much with changes in flow quantity, a pressure drop estimation formula was developed which uses a comparatively stable constant. The flow velocity is expressed as the flow quantity divided by the square of the outer tube diameter minus the inner tube diameter. The formula also considers the entrance area and the overall length of the cyclone. The new pressure drop estimation formula uses a constant ranging from 6.5 to 7.5. Estimations by this formula produced values very close to the actual pressure drop.

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APTIC NO. 49576

Kadota, Noriaki

DISPOSAL OF EXHAUST GAS. (Haikigasu shori). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Kansai Branch p. 11-18, 1972. (Presented at the Japan Society of Mechanical Engineers, Kansai Branch, Lecture Meeting, 17th, Osaka, Japan Dec. 5-6, 1972.)

Catalytic converters or catalytic mufflers designed to completely oxidate carbon monoxide and hydrocarbons are not sufficient to solve the air pollution problem of exhaust gas. Removal of nitrogen oxides is also important for prevention of air pollution. Nitric oxide is regarded as one of the main causes of photochemical smog. Therefore, a dual reactor, in which NOx is converted to nitrogen by means of hydrogen in a reducing atmosphere prior to oxidation of CO and HC, was developed. Introduction of a honeycomb reactor and a porous ceramic reactor has effected a great change in the field. The packed catalyst layer of catalytic mufflers has to be limited to 25-40 mm thick in order not to interfere excessively with the power development of the engine. The quantity of the catalyst comes within the range of 0.8-1.5 times the displacement capacity of the engine due to volume limitation. Recent use of precious metal catalysts such as platinum has reduced this ratio to as low as 0.8. A recent version of the catalyst is impregnated into a porous carrier such as alumina, thus giving much higher performance. Structural and performance characteristics of a dual reactor and a porous ceramic reactor are also discussed.

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APTIC NO. 49534

Kamiyama, Hiromichi, Koji Nakahara, and Toshiaki Kawabe

CATALYST CONVERTER FOR EXHAUST GAS CLEANING OF AUTOMOBILE INTERNAL COMBUSTION ENGINES. (Jidoshayo nainenkikan no haikigasujokayo shokubai konbata). Text in Japanese. (Daihatsu Kogyo Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 47-23606. 2p., July 1, 1972. (Appl. Oct. 21, 1970, 1 claim.)

A catalytic afterburner for cleaning automotive exhaust gas has a combustion chamber to heat the catalyst quickly to the needed reaction temperature. In a conventional catalytic converter, this initial heating is performed by an electric heater powered by the automobile battery, which usually cannot supply sufficient power for rapid heating. The conventional converter is often unable to give effective combustion since the exhaust gas does not contain many combustibles. In the improved converter, the air/fuel mixture is ignited and burned to heat the catalyst. The fuel supply is regulated by a sensor which detects the catalyst's temperature. The combustion chamber is located so that the flames reach the entrance side of the catalyst layer for effective and quick heating.

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APTIC NO. 49656

Kitani, Susumi

ON A SPECIAL ISSUE (II) DEALING WITH NUCLEAR AIR-FILTER SYSTEMS. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(2):1, June 1972. Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., 3p., Dec. 1972.

Reports on nuclear systems are reviewed. Reports were compiled under the following categories: safety and control of nuclear facilities, trapping and collection of particulate substances, and trapping and collection of volatile substances. Reports on the performance of nuclear air-filters, the development of fast reactors, the situation of noble gas retention techniques, and the aging of activated carbon filters are included.

27523

APTIC NO. 49412

Klose, Erhard, Walter Toufar, Guenter Mueller, and Winfried Huth

STUDY OF THE OPERATION OF CYCLONE COLLECTORS AND THEIR ECONOMIC USE. (Beitrag zum Betriebsverhalten von Drehstromungsentstaubern und ihren wirtschaftlichen Einsatzmoeglichkeiten). Text in German. Freiburger Forschungsh. A., no. 518:133-145, 1972. 4 refs.

In the cyclone separator the dust-laden gas flow is deflected in the cylindrical tube in circular symmetry by a guide vane. A secondary flow entering tangentially from the exit imparts a rotating movement on the gas flow. The collection efficiency of this kind of dust collector was studied on a scaled-down model designed for a volume flow of 500 cu m/hr. At a dust concentration of the uncleaned gas of 70 g/cu m, a maximum collection efficiency of 97.5% was achieved with a ratio between primary and secondary volume flow between 0.7 to 1 and 0.6 to 1. The collection efficiency of the dust collector dropped steadily but slowly with increasing dust concentration. The influence of the grain size on the collection efficiency was tested with five different dusts with a volume flow of 500 cu m/hr and varying ratios between primary and secondary volume flow. The collector was very suitable for the separation of dusts with a grain size below 1 micron, but the power demand was high. For the maximum collection efficiency, the average power consumption was 14 kWh/1000 cu m uncleaned gas.

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APTIC NO. 49537

Kobayakawa, Takashi

EXHAUST GAS CLEANER FOR AUTOMOTIVE DIESEL ENGINES. (Jidoshayo diizerukikan no haiki jokasochi). Text in Japanese. (Daihatsu Kogyo Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 47-23614. 2p., July 1, 1972. (Appl. Nov. 30, 1970, 1 claim.)

A filter-type diesel engine exhaust gas cleaner removes soot by filtration. It features a heating device to burn the collected soot. The heater automatically switches on when the exhaust gas pressure in front of the filter rises to a fixed level. When the soot is thus removed, the exhaust gas pressure drops

below the fixed level, and the fuel feed pump, motor, and heater are automatically turned off.

27525

APTIC NO. 49346

Koido, Y., H. Kawahara, M. Tsuchida, T. Tsuchiya, T. Bito, M. Sago, I. Endo, and I. Horasawa

STUDY ON SLUDGE TREATMENT (1ST REPORT). In: *Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection. Tokyo Metropolitan Environmental Protection Research Inst. (Japan), p. 21-31, 1972.*

The problem of sewage sludge odor formation associated with the use of dredged sludge from rivers and ports as well as from sewage treatment plants for land fill purposes in sea bays closed in by steel plates was studied. Sludge was discharged in the bottom of the pool, and the latter was filled up with water, with the temperature kept at 27 C consistently. Measurements after 11 days showed that raw sewage sludge was most putrefactive, followed by cured sludge, while dredged sludge was very stable. No strong relation between BOD value and odor intensity was evidenced. Odor formation could be substantially reduced by dewatering the sludge before landfill discharge, by discharging less putrefactive sludge over putrefactive one, through providing aerobic conditions in the bay, and by the addition of iron (III) chloride to bind hydrogen sulfide and other reductive gases formed during putrefaction in the form of iron sulfide or iron sulfate.

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APTIC NO. 49545

Krieger, James H.

ENERGY: THE SQUEEZE BEGINS. (*Chem. Eng. News*), 50(46):20-22, 24-28, 33-37, Nov. 13, 1972.

A synopsis of the current energy supply situation and outlook in the U.S.A. is presented. Inadequate supplies of natural gas and oil, limitations of sulfur content in coal, the most plentiful source of energy in the U.S.A., nuclear energy projects delayed partly by ecological considerations, and rising energy demand constitute the basic features of the energy supply situation. The domestic coal supply is expected to increase from 590,000,000 tons in 1970 to 1,071,000,000 tons in 1985, if sulfur dioxide control technology is commercially proved. The nuclear power supply is anticipated to rise from 23,000,000,000 kwh in 1970 to 2,067,000,000,000 kwh in 1985, accounting for 48% of the electric power requirements in 1985. Both imports of liquefied and synthetic natural gas projects should be stepped up. In fuel-to-fuel conversion, development emphasis is currently on coal gasification. Pilot plants using the Hygas, carbon dioxide acceptor and Bi-Gas processes, are supplying high-B.t.u. gas, while air gasification and underground gasification processes are suited for processing even high-sulfur coal to low-B.t.u. gas which, cleaned of sulfur, is supplied to power stations, especially to those adopting the combined turbine cycle. Hydro power is expected to account for a decreasing percentage of the total energy supply, and geothermal power represents a mere potentiality. The limited availability of uranium for nuclear power plants has forced an accelerated fast breeder development program. Hydrogen to be produced by coastal nuclear power plants by electrolysis or other technology, might become an energy carrier with vast flexibility within the energy system.

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APTIC NO. 49838

Lewis, Clifford

POLLUTION ABATEMENT WITH EMPHASIS ON SO₂ REMOVAL. Preprint, National Lime Assoc., Washington, D. C., 3p., 1972. (Presented at the National Lime Association, Annual Convention, 70th, Hot Springs, Va., May 2, 1972.)

The role of lime in pollution abatement with particular emphasis on sulfur dioxide removal through scrubbing is reviewed. The major stumbling block in the development of SO₂ control

AIR POLLUTION ABSTRACTS, JUNE 1973

technology is the problem of scaling and plugging up encountered in gas scrubbing operations. A pilot plant was constructed for the control of SO₂ and particulate matter from the stacks of coal-burning power plants and metallurgical smelters. The operating variables are reviewed.

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APTIC NO. 49961

Lewis, Clifford J.

POLLUTION ABATEMENT WITH EMPHASIS ON SO₂ REMOVAL. Preprint, National Lime Assoc., Washington, D. C., 3p., 1972. (Presented at the National Lime Association, Annual Convention, 70th, Hot Springs, Va., May 2, 1972.)

The application of lime products to sewage treatment, stack gas cleanup for meeting Environmental Protection Agency recommendations on sulfur dioxide and particulates, acid mine drainage, and miscellaneous trade waste is reviewed. The technology for removing SO₂ from the stack gases of coal burning power plants and metallurgical smelters is not yet established, the major impediment being the lack of gas-scrubbing devices which do not scale and plug up. Accordingly, a pilot-size scrubber for removing SO₂ and particulates from stacks was designed and constructed. The scrubber is a horizontal, rotating type, and features alternative internal assemblies for descaling or scale prevention. The scrubber is equipped with two lime slurry preparation tanks to accommodate use of hydrated lime; two slurry proportioning pumps for feeding the scrubber at variable rates; gas intake; measuring devices for gas flow, pressure, temperature, SO₂ content and exhaust, and particulate amounts at entry and exit. The advantages of using lime instead of limestone are also considered.

27529

APTIC NO. 49716

Marshall, W. F. and R. W. Hurn

MODIFYING DIESEL ENGINE OPERATING PARAMETERS TO REDUCE EMISSIONS. Bureau of Mines, Bartlesville, Okla., Bartlesville Energy Research Center, RI 7579, 17p., 1972. 2 refs.

GPO

The effect of engine parameters on exhaust emissions from two diesel engines was studied experimentally. Fuel-injection characteristics and intake air conditions were considered as parameters influencing the emissions. Carbon monoxide and unburned hydrocarbon emissions were at lowest levels when the engines were adjusted for best performance. Nitrogen oxide emissions could be diminished somewhat through variation in fuel-injection characteristics, but the effect of retarded timing was offset by increased smoke and CO and decreased power capability. Both temperature and composition of intake air had a significant effect on nitrogen oxide emissions. Levels of nitrogen oxides were reduced by recirculating the exhaust gas or by adding water to the intake air stream. However, the rate of water added or exhaust gas recirculated must be limited to prevent the degradation of engine performance and increased emissions of CO and smoke. At high exhaust recirculation rates, levels of CO and smoke were increased such that it was necessary to derate the engine and also to use a catalytic system for oxidation of CO. (Author abstract modified)

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APTIC NO. 49382

Martin, C. G.

THE DESIGN OF AIR-POLLUTION CONTROL EQUIPMENT. *New Zealand Eng.*, 27(10):314-320, Oct. 15, 1972. 45 refs.

The design, operation, and costs of air pollution control equipment for dusts, fumes, gases, vapors, and liquid mists are reviewed. The various equipment includes cyclone dust collectors, wet scrubbers, venturis, electrostatic precipitators, cloth filters, baghouses, and fiber demisters. For control of gaseous

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emissions, adsorption, absorption, catalytic oxidation, oxidation by combustion, and afterburning are considered.

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APTIC NO. 49487

Masaki, Kenji

EXHAUST GAS CONTROL DEVICE. (*Haikigasu taisakusochi*). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 47-23611. 4p., July 1, 1972. (Appl. Nov. 24, 1970, 2 claims).

Engines produce pollution during warm-up before the exhaust gas temperature reaches 700-900 °C and the cooling water reaches 80 °C. The warm-up period can be shortened and the exhaust gas temperature can be kept at the required level during subsequent driving by an invention which consists of two burners. One burner is installed under the intake manifold to heat the cooling water, and one is installed in the afterburner unit in the exhaust pipe. Control valves of the fuel pipes for the burners and burner ignition are controlled by thermo switches. At engine start-up, temperatures are so low that the thermo switches are turned on to feed fuel to ignite the burners, thus heating the cooling water and exhaust gases. When the water and exhaust gases reach a specified temperature, the thermo switches are turned off automatically. During subsequent driving, the burner in the afterburner unit is only used when the exhaust temperature drops below the specified level.

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APTIC NO. 49301

Matsui, Kazuma

CATALYST-TYPE EXHAUST GAS CLEANER. (*Shokubaishiki haikigasu jokasochi*). Text in Japanese. (Nippon Denso K. K., Kariya, Aichi (Japan)) Japan. Pat. Sho 47-30056. 2p., Aug. 5, 1972. (Appl. Oct. 13, 1970, 1 claim).

A catalytic afterburner is described which is connected to the exhaust pipe so that only a minimum of vibrations from the engine are transmitted to the cleaner, thus preventing possible crushing of the catalyst. An outer pipe serves as the intake port of the cleaner and overlaps the tapered portion of the exhaust pipe. The end of the outer pipe is provided with a few U-shaped hollow projections which serve as silencers. A shock-absorbing material is fitted between the end of the outer pipe and the opposite part of the exhaust pipe. The outer pipe is held in place by two stays cushioned by shock-absorbent material. The cleaner casing is also held in place by means of stays, bolts, nuts, and elastic rubber cushions.

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APTIC NO. 49579

Matsui, Kazuma

A CATALYST-TYPE EXHAUST GAS CLEANER FOR INTERNAL COMBUSTION ENGINES. (*Nainenkikan yo shokubaishiki haikigasu jokasochi*). Text in Japanese. (Nippon Denso K. K., Kariya, Aichi (Japan)) Japan. Pat. Sho 47-23612. 3p., July 1, 1972. (Appl. Nov. 25, 1970, 1 claim).

A catalytic afterburner for removing carbon monoxide, hydrocarbons, and nitrogen oxides from automotive exhaust gas is described. The cleaner is equipped with an electric air pump to supply fresh air to the exhaust pipe. Operating variables such as engine speed, negative pressure in the intake pipe, temperature of the cooling water, and automobile speed are monitored. When the engine is in a high-speed operation, no signal is sent to the air pump, so the pump does not operate. At low-speed operation such as idling or urban driving, the operation circuit detects the need to operate the air pump, and the pump is activated. Thus, the exhaust gas is mixed with sufficient secondary air before entering the catalyst unit.

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APTIC NO. 49397

Matsumoto, Takanobu

PRESENT STATE OF AIR POLLUTION CONTROL TECHNOLOGY. (*Taiki oxen boshi gijutsu no genjo*). Text in Japanese. Preprint, Fuel Society of Japan, Tokyo,

p. 293-296, 1972. (Presented at the Fuel Society of Japan, Fuel Conference, Lecture Meeting, Tokyo, Japan, Oct. 31, 1972.)

Sulfur oxides produced by the combustion of petroleum oil were about 360 tons in 1970. Coal produced another 60 tons of SO₂. Petroleum oil consumption in Japan is expected to reach 320 million kl in 1975 and 710 million kl in 1985. In 1971, the desulfurization capacity of Japan was 356,000 bbl/day, of which 70% was indirect desulfurization which is less efficient than direct desulfurization. If the 1973 objective of 890,000 bbl/day total heavy oil desulfurization capacity is realized, enough low-sulfur fuel will be produced from fuel oil desulfurization. Direct desulfurization techniques should be developed to achieve 0.8% sulfur content in fuel oil. Advantages and disadvantages of fuel oil and stack gas desulfurization are described. Gasification of asphalt or heavy oil is another possible control method. About 2 million tons/yr of nitrogen oxides are produced, of which 70% is from stationary emission sources and 30% from automobiles. Control methods for NO_x are discussed including process modifications.

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APTIC NO. 49217

Matsunaga, Naotoshi, Akio Yoshidome, and Takekuni Azuma

SO₂ ELIMINATING FILTER. (*SO₂ firuta no seino*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 146. (Nov. 7-9, Paper 101.)

The elimination rate fluctuation of a treated filter for sulfur dioxide removal was examined by long term use. The filter was treated by sodium carbonate. A mechanical prefilter of a glass fiber was used to eliminate dusts in the air, and a sirocco fan was installed in the back in order to suck in a large quantity of air. The air was continuously drawn in at the rate of 2 cu m/min. The test was conducted for over 5000 hr, and the performance was observed. A sufficient SO₂ elimination rate was obtained at the end of the period. The concentration distribution of sodium, sulfuric acid, carbonate, and bicarbonate were examined. The sulfide concentration curve shows a higher rate near the entrance of the filter, which decreases functionally as it goes deeper into the filter. This agrees with the theoretical pattern. It is believed that SO₂ removal is completed within 10 cm from the entrance of the filter.

27536

APTIC NO. 49425

Minemura, Katsuya, Isao Shoji, Teiichi Nakamura, Seikichi Nishimura, Suguru Noguchi, Koji Himi, and Yoshitaka Kobayashi

AN ENDURANCE TEST FOR A DESULFURIZATION SYSTEM AND THE TREATMENT OF ITS WASTE LIQUID. (*Haiken datsuryu sochi no taikyū shiken to haieki shori ni kansuru chosa kenkyū*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 138. (Nov. 7-9, Paper 93.)

The pilot plant stack gas desulfurization system for a small building heating boiler, which was discussed at a previous meeting, was used on an actual boiler, and its durability was examined. Sodium hydroxide solution was used as the absorbent for the stack gas of the boiler fixed and rotating types of nozzles were used for the spray tower. The SO₂ elimination rate was 91-98%. The durability was checked after 1500 hr or 6 mo of operation under the conditions of 18-22 cu m/min gas flow, at 120-220 °C temperature at the entrance and 40-60 °C at the exit, SO₂ concentration 100-1500 ppm, oxygen concentration approximately 3%, NaOH absorbent 10%, and higher than 3 pH levels. The 6-7 month check up showed that the elimination rate had not lowered, but the areas constructed with soft steel were totally corroded by NaOH and SO₂; at the part where the jet spray contacted, corrosion had started, but parts made with stainless steel had not corroded. Highly corroded parts were reconstructed with stainless steel, and continuous operation was given for 6600 hr more. At the end of the period, the desulfurization rate had not lowered and almost no

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corrosion was noted. An oxidation treatment of SO₂ containing waste liquid is further discussed.

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APTIC NO. 49401

Mirzabekian, Georgii Z.

THE AEROSOL CHARGING IN A FIELD OF CORONA DISCHARGE. (*Die Aerosolaufladung in einem Felde der Koronaentladung*). Text in German. Staub, Reinhaltung Luft, 32(11):450-451, Nov. 1972. 6 refs.

The charging of aerosol particles in a corona discharge is one of the most important methods of aerosol charging used for air cleaning. From a theoretical viewpoint the ions either move in an external electric field in direction to the aerosol particles (collision ionization), or they diffuse towards the surface of the individual particles (diffusion ionization). The influence of the individual mechanisms depends on the particle size. With particles of a radius of more than 2 to 3 micron the first mechanism is prevalent, diffusion ionization can be neglected. The latter mechanism gains importance with decreasing particle radius. For particles less than 0.08 micron to particles 0.1 micron in diameter it plays the major role. The kinetics of diffusion ionization can be approximately expressed in an equation which shows that the charge of a particle is proportional to the particle radius. In the transition size group of less than 2 micron and less than 0.08 micron it is more difficult to determine the particle charge. An equation was derived based on two assumptions, namely that the process is quasi-stationary and that the influence of the ion charges on the results agreed well with the experimental data by Hewitt. For practical purposes the particle charge in the transitional size groups can be calculated with sufficient accuracy from the sum of collision ionization and diffusion ionization.

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APTIC NO. 49429

Miura, Masakatsu, Tomoo Hamada, Kazushi Kudo, Shigeo Mitsui, and Fukashi Arai

FUNDAMENTAL RESEARCH ON DEODORIZATION BY OXIDATION (REPORT 2) - THE TREATMENT TEMPERATURE, FLUIDIZED CATALYST AND ITS ODOR REMOVAL EFFICIENCY. (*Ryudo nensho-ho ni yoru dasshu (daihiho) - Ryudo baitai to jokyō koritsu kara mita shori ondo*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 135. (Nov. 7-9, Paper 90.)

Studies were made for catalysts effective for deodorization at a lower temperature and high performance rate. The catalyst is for the use of a fluidized incinerator for the odors produced from maring product manufacturing plants. Six kinds of catalysts: popcaolite, natural zeolite, alumina, silicagel, ultra radical rock, acid-treated ultra radical rock, and silicon were examined. A 100% removal rate was obtained by the acid-treated ultra radical rock compared to 65 to 96% of other catalysts. The rocks were crushed to an average particle size 0.35 mm, mixed with 1.5 times the volume of 20% sulfuric acid; the soluble part was drained and removed. The entire left part over was used as catalyst. The catalyst was put in the incinerator, fluidized, and simulated bad odor was burned at a low temperature; the measurements were taken at the entrance and the exit of the incinerator. After treatment of a total of 70 cu m of simulated odor gases for eight hours, the catalytic removal rate was still 100%, and no by-product gases were formed. Compared to the previous methods, the combustion temperature could be lowered by 150 to 200 C.

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APTIC NO. 49218

Miyazaki, Kazuo, Shuji Yoshida, and Shigeo Nagai

SDK DESULFURIZING PROCESS. (*Showa denko-shiki haien datsuryū ni suite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 139. (Nov. 7-9, Paper 94.)

AIR POLLUTION ABSTRACTS, JUNE 1973

A wet-method desulfurization pilot plant for stack gases of an electric power plant is discussed. The pilot plant has a capacity of treating 10,000 N/cu m/hr, utilizes sodium hydroxide solution, and produces gypsum. The absorption tower has a singular shape of a reversed cone, and the stack gas is directly supplied to the lower end of the tower. Absorbent is supplied at the throat portion in the spray form, mixes with the gas, and eliminates sulfur oxides effectively. Liquid and gas are separated and the liquid is recirculated back to the absorption tower. The SO_x-containing liquid is mixed with calcium oxide or calcium carbonate and made into sodium sulfite and calcium sulfite. The Na₂SO₃ is recirculated as absorbent, and CaSO₃ is oxidized by the air under the pressure of oxidizer, to produce gypsum. The entire system is enclosed and there is no danger of creating secondary pollution.

27540

APTIC NO. 49638

Mizuochi, Toshio and Yoshikazu Hasegawa

DESULFURIZATION OF HEAVY FUEL OIL BY STEAM. *Electric Power Industry (Japan), First Technical Lab., Rept. 71107, March 1972. 9 refs. Translated from Japanese. McGregor and Werner, Inc., Washington D. C., Mundus Systems, 28p.*

To examine the effect of steam on the desulfurization of heavy fuel oil, thiophene, khafji crude oil (sulfur content 2.9 wt%), khafji vacuum gas oil (sulfur content 2.2 wt%), and khafji atmospheric residuum (sulfur content 4.3 wt%) were desulfurized with steam. A flow method was used through a catalyst fixed bed under the steam pressure of 80 kg/sq cm G. The desulfurization efficiency of thiophene was about 45% and 90% at 450 C and 500 C, respectively. Desulfurization efficiencies of crude oil and vacuum gas oil were both about 40% at 450 C. The desulfurization efficiency of atmospheric residuum was 15% at the same temperature. The highest desulfurization activity was obtained from a molybdenum-cobalt-alumina catalyst, from all the various kinds of catalysts investigated.

27541

APTIC NO. 49219

Mori, Osami, Hideo Tanaka, and Fumio Adachi

ABSORPTION OF TRACE SULFUR DIOXIDE GAS BY SODIUM HYDROXIDE SOLUTION. (*Suisanka natoriumu yoeiki ni yoru biryo arysan gasu no kyushu ni suite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 136. (Nov. 7-9, Paper 91.)

The effects of the degree of concentration of sulfur dioxide and the water content in the gas on the elimination efficiency of filters were examined. Nylon screen filters were treated in a sodium hydroxide solution and were placed in a glass tube. Dilute SO₂ gas and gas which had already been passed through the sodium hydroxide solution were passed through such screens; measurements of concentration were taken before and after the filter by the Saltzman method, and the filter permeation rates were obtained. The SO₂ gas concentration ranged between 0.005 and 0.4 ppm, and humidity was adjusted by a humidity adjuster at 0, 20, 40, 60, 80, and 100% each. Within the experimental range, an equation was obtained for the permeation rate. When the concentration of SO₂ was less than 0.01 ppm, the permeation rate drastically increased and almost no SO₂ was eliminated. When humidity was increased, the permeation rate fluctuated; the surface of the filter seemed unstable in general when humidity was high.

27542

APTIC NO. 49544

Najima, Tatsuo and Shiro Ishido

STABLE COMBUSTION OF WASTE PLASTICS, AND POINTS OF COMBUSTION CONTROL. (*Hai purasuchikku no ante nensho to nensho kanri no pointo*). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(7):24-28, July 1972.

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In the direct combustion-type plastic waste incinerator, wastes are burned on the hearth or fire grates of a furnace and then in the secondary combustion chamber if perfect combustion is not achieved in the primary combustion chamber. In the indirect type, the wastes are pyrolyzed into gas in the primary combustion chamber through restraints on volume of air and temperature in the furnace. The exhaust gas is led into the secondary combustion chamber where it is burned perfectly. The combustion characteristics of polyethylene, polypropylene, poly-vinyl chloride, and others are tabulated. Fluctuation of combustion temperature can occur due to different calorific values of the components of the plastic wastes. The slow-melting wastes often are covered with the fast-melting plastics which hinders effective ventilation. Hydrogen chloride gas from polyvinyl chloride or cyanogen from methacrylic resin remains near the object being burned, resulting in poor contact with air. With the direct combustion method, air going into the furnace at the time of feeding the wastes caused the temperature in the furnace to drop. This temperature drop causes the black smoke to develop. Another problem is that dispersion of air fails to catch up with the combustion speed when the plastic wastes are fast-burning. The temperature in the secondary combustion chamber should be 1200 C or higher. The combustion temperature in the furnace is locally different due to the uneven distribution of the wastes. With the indirect method, air leakage often causes emission of soot, so it is important to keep the temperature in the primary combustion chamber as constant as possible. Hydrogen chloride and carbon oxides evolved during the combustion have to be effectively dealt with in order to prevent secondary pollution. Carbon oxide emission is compared between the direct and indirect combustion methods.

27543

APTIC NO. 49533

Nakajima, Yasuo and Mutsuo Onoda

DEVICE TO PREVENT DAMAGE BY BURNING OF EXHAUST GAS CLEANER CATALYST. (*Haikigasu joka yo shokubai no shoson boshisochi*). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 47-23607. 2p., July 1, 1972. (Appl. Oct. 31, 1970, 2 claims).

A device is described to prevent overheating of the catalyst. A gas sampler detects the carbon monoxide and hydrocarbon concentration and converts it into an electrical quantity. When fuel gas such as blow-by gas is contained in the exhaust gas, CO and HC increase proportionately, so the presence of raw fuel gas can be determined from the quantity of CO and HC. The electric signal from the gas sampler is transmitted to an alarm device which warns the driver of possible overheating of the catalyst. The signal is also transmitted to electromagnetic valves which can be activated to control fuel and secondary air supply to avoid catalyst overheating. A bypass pipe is connected to the exhaust pipe so that the exhaust gas may be bypassed when the exhaust gas has to be shut off from the converter to prevent damage by catalyst overheating.

27544

APTIC NO. 49583

Nishimura, Seikichi, Yasuichi Naoi, Shinsuke Yamada, Osamu Mori, Masahiro Hori, and Yoshitaka Kobayashi

STUDY ON TEST FILTERS FOR REMOVING AIR POLLUTANTS. (*Taiki osen shitsu (nisanka io, fuyu jinai) no jokyo firuta no shisaku*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 145. (Nov. 7-9, Paper 100.)

The efficiency of alkaline filters for elimination of sulfur dioxide, other acidic gases, and suspended particulates was examined by a test filter pretreated in alkaline solution. Urethane foam of 20 mm thickness was soaked in a solution of 20 weight portions of caustic soda, 30 portions of geliserine, and 50 portions of water. After eliminating excess liquid, the filter was dried. A filladon(?) filter was used in front and three layers of 5 mm each urethane foam were used behind the

filter. The elimination rate of SO₂ was measured by the difference of concentration before and after, and was analyzed by the Saltzman method. The collection rate of suspended particulates was measured by the difference in weight before and after. A cascade impactor was used for measuring the size of scattered particles on the filter. The elimination rate of SO₂ was 95-98% when the concentration was 0.1 ppm, but for less concentration, the ratio was also lower. In a highly polluted area, the elimination rate did not deteriorate at all for a year (600 hr). The temperature had no effect on the elimination rate, but the humidity improved the rate. The dust collection rate was approximately 90 when the concentration was 300 to 400 micrograms/N cu m, and lower if the concentration was lower. Glycelyn mixed in the treatment solution helped to prevent scattering of particles and also prevented corrosion.

27545

APTIC NO. 49076

Nitatoge, Takashi

DEODORIZATION OF PULP MILLS. (*Parupu kojo no mushuka ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 173. (Nov. 7-9, Paper 128.)

The Uddeholm Co. of Sweden created a method of deodorization for Kraft Pulp mills by steam stripping and gas combustion, which reduces the odor producing condensation and gas. The emission sources of Kraft Pulp Mills are the digester house, the evaporator house, and the soda recovery boiler plant. Turpentine, which is emitted in the digester house while pine trees are cooked, also emits a considerable amount of odor. All the bad odors from the digesters condensers, and evaporators are collected continuously or in batches and burned in the furnace. All the condensations of sulfur compounds, turpentine, and methanol are collected and treated in the stripper; the exhaust gas from the stripper is burned with other gases. Furthermore, all the gases from the extraction pipes over various tanks are also collected and used as combustion air. This method insures 99.9%-99.99% deodorization. The flowcharts are presented.

27546

APTIC NO. 49641

Novotny, Pavel

HISTORICAL EVOLUTION OF FLUID COMBUSTION TECHNOLOGY AND COMPARISON OF VARIOUS INDIVIDUAL TYPES OF FLUID FURNACES. (*Historicky vyvoj technologie fluidniho spalovani a porovnavani jednotlivych typu fluidnich ohnisti*). Inst. for Research and Utilization of Fuels, Bechovice (Czechoslovakia), Monograph 26, 1972. 35 refs. Translated from Czech., 56p.

The fluid combustion of solid and liquid fuels, employed in the combustion chambers of steam boilers is discussed, and the historical evolution of fluid combustion technology is reviewed. The principals underlying the fluid phenomenon, the basic types of fluid layers, i.e., fluidized beds, and fluid layer theory are presented and explained. The application of fluid technology to the combustion of solid fuels is discussed, examples being given for its application in the construction of furnaces. Problems related to fluid combustion, techniques using slagged fluid layers and one and two-step techniques using slag-less fluid layers are reviewed. Furnaces using various systems are compared, including: the comparison of dimensions and weight of units heated by the one-step method and the present method, and comparison between units using furnaces with cooled fluid layers and those using non-cooled fluid layers.

27547

APTIC NO. 49984

Olea, Jose T.

THE FIGHT AGAINST INDUSTRIAL POLLUTION OF THE AIR. DRY SCRUBBERS. (*La lucha contra la contaminacion industrial del aire. Depuradores secos*). Text in Spanish. Ion (Madrid), 32(373):475-480, 483-485, Aug. 1972. 14 refs.

Dust emission control is discussed in terms of mechanical separator and filtration facility applications, referred to as dry gas scrubbing procedures. Mechanical separators reviewed include settling chambers, cyclones, and multicyclones. Settling chambers are used for preliminary purification purposes providing the removal of dust particles exceeding 100 to 150 micron in size. Cyclones and multicyclones may vary from 500 to 500,000 cu m/hr capacity, and their diameter is the essential feature of their design. The yield of a cyclone increases with decreasing diameters and increased contaminated gas flow rates at its inlet. Cyclones are most appropriate for the removal of dust particles ranging from 20 to 60 micron in size. Parallel location of several cyclones develops into multicyclones providing high gas purification yields. Filtration is discussed in terms of filter fabrics. The latter should be selected according to the chemical nature of the dust-contaminated gas and to the properties of the dust particles involved. Filtration is used for dusts of 1-10 micron particle size. The modern synthetic fiber filter fabrics allow high operating temperatures, and feature high wear resistance and low humidity absorption. As compared to wet scrubbers and electrostatic precipitators, the dry scrubbers present high separation yields and prevent water pollution with low operating and maintenance costs. Unfortunately, they cannot be applied to water vapor-contaminated gas or to flammable dust carrying gas mixtures.

27548

APTIC NO. 49639

Ono, T., Y. Hasegawa, M. Koizumi, and H. Mizuochi

STUDY ON THE CATALYST FOR CRUDE AND RESIDUAL OIL HYDRODESULFURIZATION. PART II. DESULFURIZATION ACTIVITY OF MOLYBDENUM-COBALT WITH VARIOUS SUPPORTS. *Electric Power Industry (Japan)*, First Technical Lab., Rept. 71106, March 31, 1972. 15 refs. Translated from Japanese. McGregor and Werner, Inc., Washington, D. C., Mundus Systems, 36p.

To develop high-activity catalysts for the hydrodesulfurization of crude and residual oil, the desulfurization activities of molybdenum-cobalt supported by various aluminum oxide catalysts were compared, using activity test apparatus. Experiments were carried out using the flow method on crude oil (sulfur content 3.02 wt%) at 410 C, with a pressure of 40 kg/sq cm G, and LHSV of 2.0 h-l. The highest activity was obtained by the catalysts having gamma or γ -alumina in the various types of alumina. Catalyst activity was improved by the addition of titanium dioxide to the alumina. By correlating desulfurization activity with physical properties of the catalyst, it was found that the activities of catalysts were improved with increasing specific surface area, and pore volume within pore diameter from 36 to 214 Angstrom per volume of catalyst.

27549

APTIC NO. 49990

Osugi, Toshiyuki

ON REMOVAL OF CUPOLA DUST BY ELECTRIC PRECIPITATION. (*Denki shujin ni yoru kyupora baijin jokyo ni tsuite*). Text in Japanese. Preprint, Japan Heat Management Assoc. Tokyo, p. 25-34, 1972. 6 refs. (Presented at the Conference of the Japan Heat Management Association, 13th, Tokyo, Japan, Oct. 18-20, 1972, Paper 3.)

Electrostatic precipitation is discussed centering around the dust removal system installed for a 5 t/hr cupola. To meet the present requirement to make the cupola visually smokeless, the dust concentration in the smoke has to be about 0.05 g/N cu m or lower. A dust collector capable of achieving this goal is either a bag filter or electrostatic precipitator. Advantages and disadvantages involving the two types are considered. The precipitator was adopted. It is a multi-plate type whose discharge electrodes come in the shape of a board or plate and provided with the stainless steel needle planted on the tip. The multi-plate precipitator features no breakage of the discharge lines by hammering, low discharge voltage and consequently

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less power consumption due to the needle-shaped discharge point, minimum evolution of ozone and nitrogen oxides, and smaller size to achieve the same efficiency. Composition and temperature of the emission gas are analyzed. The dust content is in an average 10 g/N cu m of the gas or 7.6 kg/t of iron melted. Also discussed are changes in the specific resistance of the cupola dust of the firm and known components of similar dust in relation to various temperatures. Generally, the specific resistance increases up to a certain temperature but decreases after that temperature mark is passed. Wet, dry, and semi-dry types of electrostatic precipitators are discussed, of which the semi-dry type is best suited.

27550

APTIC NO. 49156

Ruebel, Klaus and Gert-Wilhelm Lask

METHODS FOR PREHEATING COKING COAL IN THE UNITED STATES OF AMERICA AND GREAT BRITAIN. (*Verfahren zur Vorerhitzung von Kokskehle in den Vereinigten Staaten von Amerika und in Grossbritannien*). Text in German. *Stahl Eisen* (Duesseldorf), 92(25):1283-1286, Dec. 7, 1972. 4 refs.

The Coaltek process for preheating coal and the hard coal preheating process by the British Coke Research Association are described. With the Coaltek process the sorted and comminuted coal with a uniform grain size of less than 20 mm is passed over a screw conveyor into a pipe where the coal particles are entrained by a rising waste gas flow with a temperature of 800 C. The particles are dried and heated. Afterwards the particles are ground in a hammer mill to diameters of 2 to 3 mm. The prepared coal, now with a temperature of 260 to 280 C, goes to cyclones where it is classified and passed to a storage bunker. Eighty percent of the dust laden waste gases are returned to the combustion plant and about 20% are passed through a scrubber and then into the atmosphere. The preheating method by the British Coke Research Association also operates with waste gases of which 80% are returned to the preheating process. Drying and preheating of the coke increases the throughput significantly without adverse affects on the coke quality and the oven operation.

27551

APTIC NO. 49150

Rueckel, Hans Georg

REMOVAL OF SPECIAL REFUSE. (*Beseitigung von Sondermüll*). Text in German. *Abwassertech.*, vol. 23:38-39, 1972.

In 1969 a removal plant for special industrial refuse was constructed at Schwabach. It consists of a deposit site, a sludge dewatering plant, and an emulsion separating plant. About 20% of the total quantity of special refuse which amounts to 50,000 tons annually can only be removed by thermal treatment. The incineration plant at Schwabach burns waste oils, refuse from the tar industry, chemical refuse, waste varnishes, and lacquers. It has a capacity of 10,000 tons annually and has special equipment to prevent air pollution. The chimney has a height of 60 M, and the electrostatic precipitator is laid out so that the dust content of the emitted flue gas can be kept considerably below the legal emission limit. Owing to the special construction of the incineration plant, the emitted flue gas is not colored and is odorless. Special control devices guarantee an optimum combustion of the flue gas.

27552

APTIC NO. 49504

Schwinkowski, K.

LIMITATION OF EMISSION FROM BITUMEN MIXING PLANTS. (*Emissionsbegrenzungen an Bitumenmischanlagen*). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete* (Berlin), 18(12):948-950, 1972. 7 refs.

Bitumen mixing stations emit considerable quantities of dust, soot, and sulfur dioxide. In Kuehnhausen near Erfurt the dust emission from such a mixing station is reduced by the installation of a scrubber system comprising a spray tower, a cylindri-

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cal collector, a low-pressure turboventilator, a four-chamber sedimentation pit, and a pump. In the spray tower the dust is brought into close contact with water. In the cylindrical collector the water droplets with the adhering dust are removed from the waste gas flow. The cleaned gas is blown through a stack by the turboventilator. The dust-laden water is cleaned by sedimentation in the four-chamber basin. The cleaned water is returned to the spray tower. With this dust cleaning process the dust concentration in the dirty gas of 12.6 g/cu m is reduced to 1.01 g/cu m. The collection efficiency is 92%. The soot emission is reduced by controlling the oil quantity flowing to the burner via oil pressure and nozzle diameter of the burner.

27553

APTIC NO. 49824

Shale, C. C.

AMMONIA INJECTION: A ROUTE TO CLEAN STACKS.
Am. Chem. Soc., Div. Fuel Chem., Preprints, 17(2):106-113, 1972. 4 refs. (Presented at the National Meeting, 164th, New York, Aug. 27-Sept. 1, 1972.)

Ammonia injection followed by gas cooling was examined as an effective means for removing sulfur dioxide from the gas phase in combustion gas mixtures. Process operation, laboratory data, pilot scale equipment and operations, and process chemistry are reviewed. Product sulfur-bearing salts, entrained in the gas, are removed in a single-stage water scrubber, and ammonia is effectively regenerated from the scrubber liquid through reaction with sodium hydroxide solution. Ammonia losses are minimal and can be reduced even further through use of a second-stage scrubber. All reactants and products in the continuous cycle of the process are water soluble, preventing equipment clogging; process continuity and reliability are not interrupted. (Author conclusions modified)

27554

APTIC NO. 49151

Shimada, Jin

PROGRESS OF DRY-PROCESS FLUE-GAS DESULFURIZATION IN JAPAN. *Chem. Economy Eng. Rev.*, 4(12):15-22, Dec. 1972. 2 refs.

To meet Japanese air and emission standards for sulfur dioxide, low-sulfur fuels, desulfurization of fuel oil and coal, desulfurization of flue gas, tall stacks, and desulfurization of heavy fraction oil through cracking and gasification are being studied. Legislation, standards, and control methods are mentioned for the U. S., Canada, Britain, Germany, France, and the Scandinavian countries. About 317,900,000 kl of low-sulfur fuel will be needed in 1973 in Japan, of which 177,900,000 kl must have 1.8 wt% or less sulfur. Flue gas desulfurization processes can be classified as dry (lime or dolomite reaction with SO₂ to produce sulfate; metallic oxides used as a catalyst, e.g., the manganese oxide method; adsorption by activated carbon to produce SO₂ or dilute sulfuric acid; activated sodium carbonate method; and catalytic oxidation) or wet methods (scrubbing with lime, caustic soda, or ammonia, and absorption of SO₂ with dilute H₂SO₄ to produce gypsum). These methods are discussed in detail.

27555

APTIC NO. 49488

Shimizu, Yoshiaki

BLOW-BY GAS RECOVERY DEVICE FOR TWO-CYCLE ENGINES. (Nisaikuru enjin no fukinukegasu kaishusochi). Text in Japanese. (Suzuki Motor Co., Ltd., Shizuoka (Japan)) Japan. Pat. Sho 47-27525. 3p., July 22, 1972. (Appl. Dec. 29, 1970, 1 claim.)

Negative pressure of the crankcase chamber is used to recover blow-by gas from two-cycle engines. When the piston moves down, the compressed fuel/air mixture is pushed into the cylinder, and the combustion gas remaining in the cylinder goes through the exhaust port. The scavenging/exhaust function results in more blow-by gas which is recovered by a gas suction pipe that opens in the exhaust port. Blow-by flows into

the crankcase chamber whenever the negative pressure of the crankcase chamber opens the one-way valve of the blow-by gas suction pipe.

27556

APTIC NO. 49622

Shinzu, Yasushi, Akira Yoshikawa, and Sadao Kubota

STUDIES OF FILTERING OF SUBMICRON DUSTS. NO. 5. EFFECT OF FILTER THICKNESS ON THE FILTERING EFFICIENCY. (Sabumikuron jinai no roka ni kansuru kenbyu. Daigoho roka koritsu ni oyobosu firuta atsusa no eikyo). Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heating, Air Conditioning, Sanitary Engrs., 46(9):845-851, Sept. 1972. 4 refs.

The effects of filter thickness and wind speed on the filtering efficiency for nine different fibers were tested using polystyrene latex particles 0.35 to 0.8 micron in diameter at wind velocities of 3 to 240 cm/sec, filter thicknesses of 5 to 110 mm, and packing rates of 0.016 to 0.010. At low wind speeds, adhesion of particles on the filter fiber occurred due to diffusion, while at higher wind velocity, the particles were carried by air currents which decreased the diffusion-adhesion effect. Instead, collision-adhesion predominated as the wind velocity became higher. At a wind velocity of 3 cm/sec and 9 cm/sec, both were considered to be within diffusion region. With particles of 0.35 micron size the permeability showed a linear relationship with the filter thickness at the range of 1.0 to 0.6, independent of fiber diameter and packing rate. At high wind velocity, the so-called inertia region, collection efficiency decreased compared to the same filter thickness in the diffusion region.

27557

APTIC NO. 49089

Smieszek, Z., Z. Dalewski, and S. Peszat

RESEARCH INTO A DUST CONTROL SYSTEM OF GASES FROM SHAFT FURNACES FOR THE PRODUCTION OF COPPER MATE. (Badania ukladu odpylania gazow z piecow szybowych do produkcji kamienia miedzowego). Text in Polish. Prace Inst. Hutniczych, no. 1-2:21-30, 1972. 7 refs.

Investigations of experimental equipment for the dust control of gases from shaft furnaces for smelting copper mate are presented. The aim of the investigations was to select a technically and economically feasible system which would control dust emissions to less than 100 mg/N cu m. Physico-chemical properties of the dusts and gases, which influence the parameters of the control equipment, were determined. Experimental equipment, including cyclones for dry dust control, and venturi tubes, spray scrubbers, and electrostatic precipitators for wet dust control were tested. Test results are presented, and operating variables are determined for cyclones and venturi tubes for use in industrial installations. The basic dust control system of gases from industrial furnaces was selected as composed of preliminary control equipment (balloon channels and cyclones) and final control equipment (low-pressure venturi tubes with wet electrical precipitators and high-pressure venturi tubes).

27558

APTIC NO. 49611

Sone, Toshiyasu

ENVIRONMENTAL POLLUTION CONTROL MEASURES FOR A NEW IRONWORKS. (Shinsetsu seitetsu-jo no kankyo kanri taisaku ni tsuite). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 1-9, 1972. (Presented at the Seminar on Recent Technology of Public Pollution Control, 370th, Fukuoka, Japan, Dec. 11-12, 1972.)

The Oita Ironworks of the Nippon Steel Corp. will have three blast furnaces when completed. The productivity of pig iron and blister steel will soar to 10,800,000 t/yr and 12,000,000 t/yr, respectively. Details of the production schedule are tabulated. The plant has set up basic principles concerning environ-

mental contamination control measures, such as installation of all effective pollution control equipment immediately available or developable in the future. A thorough personnel training program was set up for environment control and rapid decision making in times of emergency. Various dust collectors were installed deemed most appropriate to the specific quality of the dusts to be discharged from each work area of the entire industry, including blast furnaces, sintering furnaces, coke furnaces, converters, hot rolling, raw ore processing yards, and coal stacks. Water spraying equipment is extensively used for suppression of dust rising from transportation of materials. The plant has adopted a skimmer for treatment of oil-trapped waste water or activated sludge for gas liquors from coke furnaces, a thickener for waste water from dust collectors, and a sedimentation pool for circulated water. Chemical analysis of the plant's waste water revealed far lower values than officially specified. Noise control methods have also been employed. Noise has been suppressed to less than 65 phons during the day and less than 55 at night. The plant has planted security forest trees, 50 m wide by 2900 m long along the boarder of the plant. The plant is making all efforts to curb emission of bad odors and to dispose of waste.

27559

APTIC NO. 49548

Sterling, Willi-Kurt

GOOD AIR HELPS TO MAINTAIN A HIGH WORKING CAPACITY AND PREVENTS OCCUPATIONAL DISEASES. (*Gute Luft erhaelt die Arbeitskraft und verhindert Berufskrankheiten*). Text in German. Zbl. Arbeitsmed., 22(11):337-340, 1972.

A scrubber for the collection of fine dusts, hydrogen chloride, sulfur dioxide, and ammonium chloride is described. The waste gases enter tangentially and pass a water mist zone where a large part of the coarse dust is separated so that only preliminarily cleaned gases proceed to the centrally arranged venturi nozzles. Additional water is injected via an annular slot at the narrowest point. In the diffuser part, the velocity energy is recovered. The separation of the gas and water mixture takes place in a centrifugal water separator. The scrubber can be easily adjusted to various air cleaning tasks since the collection efficiency is a function of the gas velocity in the venturi section and of the pressure loss. With higher gas velocity, the collection efficiency is higher. The scrubber also provides the possibility of adding chemicals to the scrubbing fluid. A collector for oil and emulsions is described which comprises a cylindrical upper part holding the fine filter and a lower cyclone section where the coarse particles are separated. One version of this unit can be set up directly at the point of origin of the polluted air flow. An open drum rotates with about 2850 rpm drawing in the polluted air and imparting an intense rotary movement on the airflow. The fine particles impact on each other, grow, and are thrown to the wall and separated.

27560

APTIC NO. 49098

Strauss, Hans-Jochen

AIR CLEANING TECHNOLOGY AS A PART OF THE ENVIRONMENTAL HYGIENE. (*Luftreinigungstechnik als Teil der Umwelthygiene*). Text in German. Melland Textilber., 57(11):1299-1301, Nov. 1972. 12 refs.

Techniques adopted in the textile synthetic fiber industry for the separation of plasticizer aerosol and organic gases from waste gases, and for cleaning process air are described. A combination of wet type dust separator and two-stage Penney electrostatic precipitator is applied to plasticizer aerosols in waste gases. Organic gases are separated by adsorption on activated carbon which is then regenerated in inert gas flow. The organic gases desorbed are incinerated. High-purity air necessary for technological processes is obtained by means of a combination of multi-stage mechanical filters with the Penney type electrostatic precipitator for the separation of ionizable particles, a potential hazard in textile technologies.

27561

APTIC NO. 49421

Tait, Nigel C.

SOME MODERN CONCEPTS IN ENGINE DESIGN.

SAE-Australasia, 32(4):132-143, Sept.-Oct. 1972. 6 refs. (Presented to the Society of Automotive Engineers, Victoria Division, Melbourne, Australia, Nov. 1971.)

Trends in engine design and design priorities are outlined. Increase in engine size and performance, reduction in compression ratio, specific output and pollution, and the use of aluminum, plastics, and other light-weight materials are among the basic trends in engine design. Compression ratios are decreasing due to the need to run on low-lead gasoline and to reduce nitrogen oxide emissions. Low surface to volume ratio of the combustion chamber is necessary for reduced hydrocarbon emission. A gradual swing to the open type of combustion chamber with a squish area just sufficient to induce precombustion turbulence seems probable. Port dimensions are decreasing for high port velocity. Reduced valve overlap and increased valve lift will be required for hydrocarbon and nitrogen oxide emission control. Vacuum retard ignition system, air injection after the exhaust valve, and fuel injections are among the basic means to reduce both hydrocarbon and carbon monoxide emissions. While the internal combustion engine, though modified, will be around in the 1980's, gas turbine and Stirling cycle engines are not credited with becoming of practical interest. Stratified charge combustion process, and conversion to liquefied petroleum gas are promising.

27562

APTIC NO. 49262

Takahashi, Shoichi, Keijin Muranaka, Hiromichi Hashizume, Masaru Iida, and Yu Igurashi

INVESTIGATION ON THE APPLICATION OF LOW-TEMPERATURE CARBONITRIDING PROCESS. (*Teion gasu shintan chikka shori no jitsuyoka kenkyu*). Text in Japanese. Mitsubishi Juko Giho (Mitsubishi Heavy Ind., Tech. Rev.), 9(4):461-470, July 1972. 3 refs.

The low-temperature carbonitriding process for permeating nitrogen and carbon into iron and steel in an atmosphere consisting of ammonia gas and endothermic gas at a temperature of 570°C was studied as a substitute for the conventional tufftriding process in the production of automotive engine and transmission parts. The major disadvantage of the tufftriding process, i.e., the emission of cyanide ions as pollutants, is eliminated with the new process, while fatigue strength and wear resistance remain unchanged. Process variables and applications are reviewed.

27563

APTIC NO. 49498

Takahashi, Satoru

A SECONDARY AIR FEED DEVICE IN AN EXHAUST GAS CLEANER OF A TWO-CYCLE ENGINE.

(*Nisaikuru enjin no haikijokasochi ni okeru nijikuki kyokuyosochi*). Text in Japanese. (Suzuki Motor Co., Ltd., Shizuoka (Japan)) Japan. Pat. Sho 47-27526. 3p., July 22, 1972. (Appl. Dec. 29, 1970, 1 claim).

A secondary air feed device is described for use in an afterburner of a two-cycle engine. The afterburner has a blow-by gas combustion chamber adjacent to the exhaust port. When the exhaust port is closed, the blow-by gas is ignited, and the flame reaches the exhaust gas. Thus, both blow-by and exhaust gases are burned. Secondary air enters both the blow-by combustion chamber and the exhaust gas area to ensure complete afterburning without unduly diffusing the blow-by gas into the exhaust gas.

27564

APTIC NO. 49640

Takanari, Noboru and Takashi Tanaka

DESULFURIZATION OF PETROLEUM COKE. *Electric Power Industry (Japan)*, First Technical Lab., Rept. 71108, March 1972. 11 refs. Translated from Japanese. McGregor and Werner, Inc., Washington, D. C., Mundus Systems, 29p.

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The effects of various factors on the desulfurization reaction of high sulfur petroleum coke and the reaction mechanism were investigated. The sulfur content could be lowered from 7.7 wt% to about 1 wt% under the following conditions: reaction temperature at 800 C, hydrogen pressure at 10 kg/sq cm G, hydrogen flow rate of 101/hr, and a reaction time of 2 hr. The initial reaction rate of coke increased with the decrease in particle size. But the reaction rate for finer particle size of coke reduced more rapidly with the progress of the reaction and sulfur removal equalized nearly in each particle of coke after the 2 hr reaction time. Sulfur removal was the largest at the reaction temperature of 800 C. Diffusion of hydrogen through the gas film boundary layer on the petroleum coke particle was not considered to be the rate controlling resistance. At the initial reaction of hydrogen with the coke, the reaction rate was controlled by the diffusion in the pores of the particles. The rate controlling resistance shifted to the surface chemical reaction or the diffusion in the solid phase of coke.

27565

APTIC NO. 49536

Tanazawa, Yasushi, Mitsumasa Yamada, Kanji Ito, and Kenji Ishiguro

EXHAUST GAS CLEANER. (*Haikigasu jokasochi*). Text in Japanese. (Nippon Denso K. K., Kariya, Aichi (Japan); Toyota Central Lab., Nagoya (Japan); and Toyota Automobile Manufacturing Co. (Japan)) Japan. Pat. Sho 47-23616. 5p., July 1, 1972. (Appl. Dec. 1, 1970, 2 claims).

An afterburner is described in which secondary fuel and air are controlled by detection of exhaust gas temperature. An electromagnetic valve controls the secondary air, and two valves, each of which can be opened or closed independently, control secondary fuel. At engine start-up, more air and fuel can be fed into the exhaust chamber than after the temperature reaches the reaction temperature level. When the temperature rises too much, the supply of secondary air and fuel is automatically limited or shut off to lower the temperature, thus protecting the unit from overheating.

27566

APTIC NO. 49298

Tanazawa, Yasushi, Mitsumasa Yamada, Kanji Ito, and Kenji Ishiguro

EXHAUST GAS CLEANER. (*Haikigasu jokasochi*). Text in Japanese. (Nippon Denso K. K., Kariya, Aichi (Japan); Toyota Central Research Labs. (Japan); and Toyota Automobile Manufacturing Co. (Japan)) Japan. Pat. Sho 47-30964. 7p., Aug. 11, 1972. (Appl. Dec. 26, 1970, 2 claims).

An afterburner automobile exhaust cleaner using secondary fuel is described. The secondary fuel feed system consists of a fuel nozzle and fuel evaporator. During high-speed driving, the exhaust gas is hot enough to burn by itself, in which case the secondary fuel feed may be stopped or reduced by feeding the fuel through the evaporator, thus economizing secondary fuel. A regenerative heat exchanger could also be used in addition to the fuel feed system to further improve the economy of the afterburner.

27567

APTIC NO. 49681

Thomson, John C. and Henry L. Gompf

EMISSION REPORT ON THE TSURUMI TRADING CO. MANIFOLD. Office of Air Programs, Test and Evaluation Branch, Rept. 72-15, APTD-1399, 4p., Feb. 1972.

The exhaust emission characteristics of a car equipped with a modified manifold system were studied to determine the effect of the modifications on emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. Basically, the Tsurumi system provides a method for preheating the air-fuel mixture prior to combustion. The modified engine system had no significant effects on emission levels; any significant emission reduction would require considerably more control over the air-fuel ratio and probably a catalytic converter.

27568

APTIC NO. 49982

Urbanek, Andrzej

THE EFFECT OF LINEAR VELOCITY OF GASES ON THE RATE OF SO₂ OXIDATION ON INDUSTRIAL VANADIUM CATALYSTS. (*Wplyw predkosci liniowej gazow na szybkość utleniania SO₂ na przemysłowych katalizatorach wanadowych*). Text in Polish. *Przemysł Chem.*, 51(9):583-587, 1972. 25 refs.

The methods of determination of the external diffusion influence on the speed of the contact catalysis are reviewed. The literature data regarding determination of the coefficient of the mass transfer between the external surface of the catalyst and reagent current are reviewed and discussed. The absence of agreement between the data from various sources is mentioned. The influence of the linear gas speed on the speed of sulfur dioxide oxidation in industrial vanadium catalysts was experimentally studied. The measurements of the process speed were obtained by the differential method. It was confirmed that in the contact apparatus used in sulfuric acid plants, the process takes place outside the influence of the external diffusion.

27569

APTIC NO. 49381

Vincent, James H.

INVESTIGATION AND ANALYSIS OF A GRID-TYPE ELECTROSTATIC PRECIPITATOR. *Atmos. Environ.*, 6(12):927-942, Dec. 1972. 4 refs.

The design, basic collection mechanisms, and operation of a grid-type electrostatic precipitator were analyzed. The precipitator consists of a number of flat perforated grids parallel to one another and perpendicular to the air flow of electrically charged dust particles. Alternate grids are connected together at ground potential and intervening grids at high voltage. The dust particles pass through a succession of electric fields whose directions are alternately opposed to the gas flow for vortex-enhanced precipitation or aligned with the gas flow for electrostatic interception. Collection efficiencies greater than 90% can be effected at a gas velocity of 183 cm/sec. (Author abstract modified)

27570

APTIC NO. 49356

Weisburd, Melvin I.

FIELD OPERATIONS AND ENFORCEMENT MANUAL FOR AIR POLLUTION CONTROL. VOLUME II: CONTROL TECHNOLOGY AND GENERAL SOURCE INSPECTION. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Pub-APTD-1101, 390p., Aug. 1972. 62 refs.

NTIS: PB 213009

The technology of source and emission control including operation modifications, particulate control equipment, sulfur dioxide removal systems, and control equipment for gases and inspection procedures for general sources, fuel burning equipment, incinerators, open burning, odor detection, and motor vehicle visible emissions are reviewed. The design and operating variables are examined for gravitational settling chambers, cyclone separators, scrubbers, fabric filters, electrostatic precipitators, afterburners, packed and spray towers, venturi absorbers, adsorption equipment, and condensers. The SO₂ removal systems, with specific application to power plants, include the limestone/dolomite injection dry and wet processes and catalytic oxidation. The design, operation, emissions, and inspection procedures are outlined for coal, fuel oil, and fuel gas fired equipment; incinerators; open burning methods; and motor vehicles.

27571

APTIC NO. 49717

Welsh, R. A. and A. W. Deurbrouck

PHOTOELECTRIC CONCENTRATOR FOR THE WET CONCENTRATING TABLE. *Bureau of Mines*, Pitt-

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sburgh, Pa., Pittsburgh Energy Research Center, RI 7623, 10p., 1972.

GPO

A photoelectric concentrator apparatus which is capable of collecting incremental products from the discharge of wet concentrating tables has been developed. The instrument uses photoelectric cells as sensors to differentiate between two products which have differences in color or reflectivity. The photocells are of the cadmium selenide type with a peak spectral response at a wavelength of 7350 Å. The photocell is basically a semiconductor whose resistance varies when exposed to changes in light intensity or color. The photocells provide a signal which, across a photoelectric amplifier-controller, controls a mobile splitting device that separates the products. Tests conducted on a wet table demonstrated the ability of the apparatus to separate a product containing 81.5% of pyrite from a lower-grade coal product containing only 68.8% pyrite. The photoelectric concentrator should have a broad application for collecting concentrates with visible color or reflectivity differences from wet concentrating tables.

27572

APTIC NO. 49477

Wesenberg, H.

GAS COLLECTION AND CLEANING IN CLOSED PREBAKED SYSTEMS. Preprint, Norwegian Society of Professional Engineers, Oslo, 11p., 1972. 2 refs. (Presented at the International Symposium on the Fluoride Problem in the Aluminum Industry, May 24-26, 1972.)

A combination of wet scrubbing with dry cleaning (bag filters) as adopted at an aluminum smelting plant in Norway for the removal of fluorides and sulfur dioxide from potline emissions is described. Neither wet scrubbing nor electrostatic precipitation proved to be sufficient to meet the requirement for a maximum external emission of 1 kg of fluorine per ton of metal in new potlines. A minimum collecting efficiency was achieved by introducing a forced inlet of the necessary ventilation air through the basement with the aid of fans so that the amount of air could be maintained at a predetermined level instead of using roof ventilation. The potroom vents are thus working with the collecting system from the pots instead of against it. The results from the first year of operation indicate that under normal conditions the cleaning efficiency will be well over 98%. The dry cleaning system seems to be relatively unaffected by variations in the fluorine content in the raw gases. The combined system of dry scrubbing and wet washing made it possible to remove at least 80% of the sulfur emission in addition to the fluorides. Maintenance of the bag filtering system is mentioned.

27573

APTIC NO. 49079

Wett, Ted

NEW AUTOS AGGRAVATE GASOLINE HEADACHE.

Oil Gas J., 70(46):102-103, Nov. 13, 1972.

Increased automobile sales combined with more emission control devices and lower compression ratios (an 0.27 drop to 8.17:1 for 1973 from last year's 8.44:1) will aggravate the climb in gasoline demand. A predicted increase of 4-5% for 1972 turned out to be closer to 6%; it can be expected to stay high through 1973. The 1973 models are designed to operate on regular gasoline with a research octane number of at least 91. Emission controls in the 1973 models include exhaust gas recirculation to eliminate nitrogen oxides, choke controls to eliminate hydrocarbons, cold air ducted to the carburetor to increase engine power and permit greater spark advance for fuel economy, and air injection to burn hydrocarbons and carbon monoxide. Consumers are not buying low-lead or unleaded fuel, even though some 20% of the cars on the road can run on 91 octane. Despite sagging sales in low and unleaded fuels, refiners have been gearing up to meet no-lead requirements for 1974 and beyond.

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APTIC NO. 49980

Weychert, Stefan and Trela Marek

ADIABATIC LABORATORY MODEL OF THE SEGMENT OF CONTACT LAYER FOR SO₂ OXIDATION.

(Adiatyczny laboratoryjny model wycinka warstwy kontaktowej do utleniania SO₂). Text in Polish. *Przemysł Chem.*, 51(9):588-591, 1972. 5 refs.

A study of the process of the contact sulfur dioxide oxidation on the vanadium Wolfen catalyst in a laboratory quartz adiabatic reactor was carried out. Measurements were made preserving grain size, gas composition, and the linear speed as they occur in the industrial contact apparatus. The operative lines of the process in the reactor conformed well with the lines computed by the method based on laboratory measurements of the real technical speed of the contact process. This indicates the lack of heat flow in the contact layer under the measurement conditions.

27575

APTIC NO. 49460

Yeh, Hsu-Chi

A FUNDAMENTAL STUDY OF AEROSOL FILTRATION BY FIBROUS FILTERS. Minnesota Univ., Minneapolis, Dept. of Mechanical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., March 1972, 260p. 91 refs.

Brownian diffusion, direct interception, and inertial impaction are the main filtrations mechanisms. A computational procedure to predict the efficiencies of a fibrous filter for both the continuum and the slip flow regimes was developed. A modified Kuwabara-Happel flow field was developed to taking into account the slip effects. A procedure for determining the effective fiber length factor to assess filter nonuniformity was developed. The single fiber efficiency was calculated by solving the convective-diffusion equation with the equations of motion of the particles, or by integrating the equations of motion of the particles trajectory for the case of Peclet number tending toward infinity. The solutions for both cases were done numerically on a digital computer. The results are tabulated and presented in graphs. To verify the theoretical results, a few selected experiments were performed using filters of uniform sized fibers and monodispersed aerosols of dioctyl phthalate. The filter consisted of dacron fibers of 11.3 micron in diameter and of particles ranging from 0.327 to 1.07 micron. Filter fiber volume fraction was varied between 0.013 and 0.0851 and pressure between 0.2 and 1 atmosphere. Good agreement between theory and experiments was obtained.

27576

APTIC NO. 49155

Yoshinaga, Shunichi, Sadao Iki, Toshiyuki Nagaishi, and Masuru Matsumoto

STUDY ON DESULFURIZATION OF COAL. (Sekitan no datsuryu ni kansuru kenkyu). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Poll., 13th, 1972, p. 137. (Nov. 7-9, Paper 92.)

A method of desulfurization of the combustion gas of coal by an adsorption agent was studied. The adsorption agent is a combination of manganese oxide and calcium carbonate, or calcium hydroxide. Sulfur dioxide is eliminated in the form of a metal sulfide. Six kinds of coal from three different areas were tested. The comparison of sulfur analysis by the total sulfur combustion method and the metal sulfide method showed that the total combustion method produced slightly higher combustion capacity. The sulfur emission quantity at various temperatures showed that most of the S was emitted at 500 C; only a traceable amount was emitted at 800 C and 100 C; but much S was emitted again at 1350 C. This was presumed a further decomposition of adsorbed ferrous sulfide, manganese sulfide, calcium sulfide, and aluminum sulfide. Therefore, it is necessary to eliminate CaSO₄ below 1000 C, not to release it again by higher temperature. The best adsorption result was obtained when the proportion of MgO and

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CaCO₃ was 2:1. By adding 0.3-0.9 g of calcium hydroxide, the amount of S adsorbed by heating was examined. The amount of Ca(OH)₂ had almost no effect, and almost all of S was adsorbed at 800 C.

27577

APTIC NO. 49093

Zambeli, Mico and Franc Sef

DESULFURIZATION OF FUEL OIL WITH A VIEW TO THE CONTAMINATION OF AIR. (Desulfuracija ulja za lozenje s osvrtom na zagađivanje zraka). Text in Croatian. Nafta Broj, 23(12):611-617, Dec. 1972). 14 refs. (Presented at the Symposium on Technology Rationalization Problems with Special Reference to Hydrogen Applications, Opatija, Yugoslavia, Jan. 14-16, 1971.)

Air contamination by sulfur oxides is primarily caused by burning coal and residual fuel oils. The effects of sulfur oxides on the environment and methods for decreasing the pollutants are discussed. The wet and dry desulfurization processes in treating exhaust gases are analyzed, as well as those processes based on fuel gasification. Catalytic desulfurization of residual fuel oils by hydrotreatment is reviewed. Direct and indirect desulfurization methods, operating conditions of the various processes, and desulfurization costs are considered. Sulfur dioxide content in the air of urban areas in Yugoslavia is discussed. Emission reduction would involve the use of distillate oils.

1971

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APTIC NO. 49841

Radian Corp., Austin, Tex.

A STUDY OF THE LIMESTONE INJECTION WET SCRUBBING PROCESS. (FINAL REPORT). VOLUME III. Air Pollution Control Office Contract CPA 70-45, APTD-1185, 136p., Nov. 1, 1971. (Includes TN 200-004-17.) NTIS: PB 211750

A computerized process model was developed to simulate the limestone wet scrubbing system designed for a TVA power plant. System organization, operating instructions, the chemical equilibrium program used in the system, and sample input deck and program listings are described.

27579

APTIC NO. 49855

Massachusetts Inst. of Tech., Cambridge, Clean Air Car Race Committee

CLEAN AIR CAR RACE - 1970. A SUMMARY REPORT. Air Pollution Control Office Contract CPA-70-169, Rept. APTD-0680, 299p., Feb. 1971. 8 refs. NTIS: PB 199479

The 1970 Clean Air Car Race (CACR) is discussed. Sources and health effects of air pollution, current control procedures for internal combustion engines, the events leading to the CACR, and achievements and impacts of the race are mentioned. In the race, seven vehicles out of 43 bettered stringent Federal exhaust emission control standards for hydrocarbons, carbon monoxide, and nitrogen oxides. However, because the CACR test procedure differed from Federal test procedures, there is some question as to whether the vehicles actually bettered the standards. The CACR increased engineering education within universities, increased interaction between participating organizations, had political impact, added to public information, and caused new system design and hardware development. Vehicles tested included internal combustion engines with control devices; Rankine steam engines; Stirling cycle engines; Brayton cycle gas turbines; electric engines using batteries; hybrid-electric engines; internal combustion engines burning gaseous fuels (liquefied natural gas, compressed natural gas, and liquefied petroleum gas); and internal combustion engines running on leaded and unleaded gasoline, kerosene, methanol, and diesel fuel. Costs and financing of the race are discussed.

27580

APTIC NO. 49859

Japan Development Bank, Dept. of Investigation

REPORT ON INVESTIGATION OF FACILITIES INVESTMENT PLANS, 1971 AND 1972. (Showa 46-47 nendo setsubi toshi keikaku chosa hokokusho). Text in Japanese. 208p., Oct. 1971.

According to the responses to an industrial investment questionnaire, pollution control facility investments for 1970 were \$542 million (an increase of 49% over 1969), and the budget plans for 1971 were approximately \$1006 million (an increase of 86% over 1970). Approximately 30% of the total pollution control investments for both years were applied toward already existing factories. They also included investments for pollutionless manufacturing processes, mostly for automobile industries and petroleum refining, of approximately \$97 million for 1970, \$77 million for 1971, and \$56 million for 1972. Industries with a high ratio of pollution control investments in 1971 were petroleum refining (13%), non-ferrous metals (11%), paper and pulp (10%), chemical (8%), iron and steel (7%), and electric power (6%). The total investments by these six categories shared approximately 80% of the total investments. For 1971, 62% of the total investments were toward air pollution control, and 31% for water pollution. Large spendings for air pollution facilities were in the petroleum refining industries (87%), electric power (93%), ceramics (77%), and non-ferrous metals (72%).

27581

APTIC NO. 49891

Alpert, S. B.

THE FUTURE OF FOSSIL FUEL TECHNOLOGY.

Preprint, American Assoc. for the Advancement of Science, Washington, D. C., 28p., 1971, 11 refs. (Presented at the American Association for Advancement of Science, Annual Meeting, 138th, Philadelphia, Pa., 1971.)

The current energy crisis concerns the scarcity of clean fuels at low cost in the form of nonpolluting gases and liquids, and not a shortage of energy per se. The crisis derives from the increased use of energy by a society in which services and non-capital generating uses for energy have made possible a desirable standard of living; environmental restrictions on using dirty fuels and increased use of energy by industry are also implicated. The demand for energy and its importance to the U. S. industrial society are put into perspective, including the potential shortage of clean energy over the next three decades, and new technology needed in the future to satisfy the demand for clean energy. The relationship between the gross national product per capita and the utilization of energy is shown. Economic incentives for new process development for converting fossil fuels to other forms depended upon the ability of newer techniques to process large quantities of raw materials in single-train units of large capacity to manufacture gasoline. Development of new technology for fossil fuels and objectives of the refiner are discussed. Energy costs, demands, and sources are considered. A budget for new technology is broken down into coal, electric, gas, and petroleum research, as well as future automobile power plants, breeder reactor development, solar energy, geothermal, tidal, and fusion power. Options available other than to develop new technology are listed.

27582

APTIC NO. 49908

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, and L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME II. TECHNICAL EVALUATION. Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1166, 576p., Nov. 1971. 113 refs.

NTIS: PB 212960

The effectiveness and economics of fluidized bed combustion boilers in pollution abatement and steam/power generation

were evaluated with respect to technical specifications, design criteria, fields of application, and operating variables. An industrial boiler, a utility boiler operating at atmospheric pressure for conventional steam plants, and a utility boiler operating at 10 atm in a combined steam and gas turbine power plant were designed and examined. Overall capital and operating costs were estimated for both 300 and 600 megawatt plants. The effects of calcium-sulfur ratio on sulfur retention; effects of bed temperature, gas velocity, additive and local type, and stone size on sulfur dioxide emissions; and effects of fluidizing velocity on heat transfer were examined. The pressurized fluidized bed combustion boiler operating in a combined cycle power plant was most effective in meeting projected emission standards and in reducing total SO₂, nitrogen oxide, and particulate emissions. The plant has an estimated capital cost 20% less and energy cost 10% less than a conventional utility plant with a stack gas scrubber. A fluidized bed oil gasification desulfurization system was also designed and evaluated as an add-on unit for reducing SO₂ emissions from utility boilers burning high-sulfur oils. The estimated capital cost of the unit was as much as 50% less than an add-on wet scrubbing system. (Author abstract modified)

27583

APTIC NO. 49317

Bulke, Peter

REMOVAL OF ANIMAL EXCREMENTS IN MASS-STOCK KEEPING. (Kotbeseitigung in der Massentierhaltung). Text in German. *Umweltforschung*, no. 58:67-70, 1971. (Presented at the Seminar on Environmental Research, Hohenheim University, Stuttgart, West Germany, 1971.)

A great problem in densely populated areas is the removal of the animal excrements. The usual method is to use the excrements as manure, however, it is not applicable in most cases since the quantity of excrements is too large for the available rural area. A composting of the excrements can be effected by mixing them with organic substances like turf, straw, or foam material. This mixture is then sterilized, stabilized, and rendered odorless and can then be sold as valuable humus manure. Artificial drying is mostly applied for fowl excrement owing to its high content of plant nutrients. Artificial drying is performed in slowly rotating drums. A disadvantage of this method is the development of bad odors which might be decomposed in biological filters by means of microorganisms, a system which does not work satisfactorily due to the sensibility of the bacteria. The incineration of excrements is not useful, due to the problem of air pollution and the development of bad odors. The method to produce biological gas from liquid dung by means of an anaerobic procedure is no longer used because it is not economical.

27584

APTIC NO. 49840

DeBerry, David W., Philip S. Lowell, Delbert M. Ottmers, Jr., and James L. Phillips

A STUDY OF THE LIMESTONE INJECTION WET SCRUBBING PROCESS. (FINAL REPORT). VOLUME II. Radian Corp., Austin, Tex., *Air Pollution Control Office Contract CPA 70-45, APTD-1184*, 110p., Nov. 1, 1971. 2 refs. (Contains TN 200-004-12, TN 200-004-19, and TN 200-004-21.)

NTIS: PB 211749

A computerized process model was developed to simulate the limestone wet scrubbing system designed for a TVA power plant. Three models are presented, including all calculations and computer programs. The process model is described, and calculations of the enthalpy of aqueous ionic solutions and equilibrium calculations for scrubbing experiments are examined.

AIR POLLUTION ABSTRACTS, JUNE 1973

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APTIC NO. 49630

Gompf, Henry L.

EXHAUST EMISSIONS FROM A PASSENGER CAR EQUIPPED WITH BRISKO S HEAVY DUTY PCV VALVE. *Air Pollution Control Office, Div. of Emission Control Technology, Rept. 71-20, APTD-1423*, 4p., Feb. 1971.

The exhaust emission characteristics of a passenger car equipped with a heavy duty positive crankcase ventilation valve adaptation were tested to determine the effect of this device on fuel consumption and emissions of carbon monoxide, hydrocarbons, carbon dioxide and nitrogen oxides. Emission reductions with the device were marginal, and only a 3% increase in fuel economy was effected.

27586

APTIC NO. 49479

Harwood, Colin F.

ASBESTOS AIR POLLUTION CONTROL. (FINAL REPORT). *Illinois Inst. of Tech., Chicago, Research Inst., Illinois Inst. for Environmental Quality Contract 10.007, Rept. IIEQ 71-8, 71-8, 77p., Nov. 1971*. 29 refs.

NTIS: PB 205238

Asbestos can be divided into serpentine (chrysotile) and amphibole types. Sources of asbestos emission into the atmosphere include rock outcrops, farming, construction, brake linings in automobiles, talcum powder, asbestos-cement products, asbestos asphalt and vinyl floor tile products, asbestos paper products, asbestos paint and coating fillers, asbestos friction materials and gaskets, asbestos textile products, sprayed asbestos insulation, and field fabrication of asbestos products. Control techniques include hoods, ventilation, cleaning, protective clothing, suction devices to collect dust in filter bags, substitution of other materials for asbestos, cyclones, baghouse filters, fabric filters, fans, and improved storage of asbestos and asbestos waste products. Disposal of waste products can cause water pollution when dumped in settling ponds or allowed to drain away into streams and lakes, or can cause further air pollution if dumped in the open or burned. Beer contained 4.3 times 10 to the 6th power fibers of asbestos/l, tap water in Ottawa contained 2.0 times 10 to the 6th/l, tap water in Toronto contained 4.4 times 10 to the 6th/l, and melted snow in Ottawa contained 172.7 times 10 to the 6th/l. Airborne asbestos particles can be sampled by membrane filters, impingers, thermal precipitators, and particle counters. Particles can be analyzed by microscopy or other optical methods. Estimates of nationwide asbestos emissions from various industries are presented.

27587

APTIC NO. 49888

Jasinsky, Zdenek and Bretislav Divak

CEILING NOZZLES FOR THE BLASTING OF DUST ADDITIVES INTO THE BATH OF STEEL MELTING FURNACES. (Stropni trysky pro dmychani prachovych latek do lazne ocelarskych peci). Text in Czech. *Hutnicke Listy*, 26(7):473-481, July 1971. 10 refs.

Research and development of steel desulfurization in open hearth furnaces and of the addition of lime powder, and tests on the abrasion of materials for ceiling lances have been carried out. The optimal design and construction of a ceiling nozzle (lance) for the blasting of lime in a dust form (granulation from less than 0.06 mm to more than 1.5 mm) by oxygen onto the surface of metal baths of steel furnaces was sought by calculation and experimentally by comparing the efficiency of three different nozzle constructions of different shape, nozzle heat expansion compensation, nozzle cooling system, and joints between the several parts of the nozzle principally between its copper and steel parts. A nozzle was sought with a blasting capacity of 700-800 N cu m/hr oxygen plus 250 kg CaO/min. or 1100-1200 N cu m/min oxygen under pressure of 3.5 kp/sq cm without lime. In addition, tests were performed to find the most abrasion resistant material for the construc-

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tion of the nozzle by exposing platelets made from different steel alloys to a blast of silica sand and weighing the platelets before and after exposure. The best performing nozzle had a cone-shaped head, four jets inclined 30 degrees from the vertical axis, and eight water cooling channels in the mantle surrounding the nozzle.

27588

APTIC NO. 49839

Lowell, Philip S., Delbert M. Ottmers, Jr., Thomas I. Strange, Klaus Schwitzgebel, and James L. Phillips

A STUDY OF THE LIMESTONE INJECTION WET SCRUBBING PROCESS. (FINAL REPORT). VOLUME 1. Radian Corp., Austin, Tex., Air Pollution Control Office Contract CPA 70-45, APTD-1183, 138p., Nov. 1, 1971. 8 refs.

NTIS: PB 211748

A computerized process model was developed to simulate the limestone wet scrubbing system designed for a TVA power plant. The effect of process variables on overall process performance was quantitatively estimated. The effects of limestone composition, sulfite oxidation, and limestone dissolution rates were significant. Pilot scale experiments were conducted using a venturi scrubber. Test plan design, development of sampling and analytical techniques, chemical analysis of scrubber liquor samples, and data interpretation are reviewed. The measured sulfur dioxide removals did not closely approach the vapor-liquid equilibrium amount. A computational technique was also developed for calculating the enthalpy of process streams in limestone wet scrubbing systems. (Author abstract modified)

27589

APTIC NO. 49893

Lundberg, Robert M.

STATUS OF SO₂ REMOVAL SYSTEMS. Preprint, American Assoc. for the Advancement of Science, Washington, D. C., 10p., 1971. (Presented at the American Association for Advancement of Science, Annual Meeting, 138th, Philadelphia, Pa., 1971.)

Some of the difficulties which are observed in the present day development of stack gas cleaning processes are described, with particular reference to the utility industry and sulfur dioxide emissions. About 18 months ago, the National Academy of Science stated that commercially proven technology for control of sulfur oxides from combustion processes does not exist. At the present time, the Alkalized Alumina, the Reinluft, the Sulf-acid, and the Wellman Lord processes have been shut down for varying reasons. The Academy suggested that complete development of the limestone process should be given high priority because of its applicability to many existing boilers and that it seemed closer than others to demonstrated industrial application. The basic problem with stack gas scrubbing is twofold: the application or extrapolation of scientific principles to technological success, and a comparison of the economics of the system with other alternatives. In addition to conditions of large size, large power demands, and distribution problems, there are formidable chemical problems associated with limestone scrubbing processes. For example, the calcium oxide, sulfite, sulfate, and calcium carbonate mixtures in the slurry present solubility and pH problems that result in scaling and corrosion at different points in the same apparatus because of stratification. Disposal problems also exist. Although 90% of the funds are being spent on limestone scrubbing, it is felt at the Commonwealth Edison Co. that the most attractive project on the near horizon is the production of low Btu gas a clean boiler fuel by the total gasification of coal.

27590

APTIC NO. 49875

Patterson, D. J., B. Carnahan, R. H. Kadlec, H. A. Lord, J. J. Martin, W. Mirsky, and F. Sondreal

KINETICS OF OXIDATION AND QUENCHING OF COMBUSTIBLES IN EXHAUST SYSTEMS OF GASOLINE ENGINES. Michigan Univ., Ann Arbor, Dept. of Mechanical Engineering, Coordinating Research Council Contract CAPE-8-68(1-68)-CRC and National Air Pollution Control Administration Contract CPA-22-69-51, Annual Progress Rept. 310830-2-P, 108p., Feb. 21, 1970-Feb. 23, 1971. 22 refs.

NTIS: PB 208249

Exhaust thermal reactors were studied to determine their emission characteristics when installed on typical engines operated at various conditions on a dynamometer test stand; to measure chemical species and determine chemical reaction rates at the entrance to, within, and at the exit from thermal reactors; to obtain information helpful in predicting the design of gasoline engine exhaust reactors; and to develop a computer model for thermal reactors. Extensive studies were made on a model multicylinder engine reactor. Depending on operating conditions of exhaust temperature, flow, air injection, and mixture ratio, conversion of exhaust hydrocarbons, carbon monoxide, and hydrogen ranged from 0 to 90-100%. Under nonoptimum conditions of air injection and temperature, olefin and aldehyde compounds increased. Reactor contents were poorly mixed; under warmed-up conditions, conversions were mixing-rather than reaction rate-limited; under cold and warming-up conditions, reactions were kinetically (temperature) limited. Gross kinetic rate equations were developed for HC, CO, and H₂. Maximum temperatures in the reactor were 50% or less; thus, the temperature nonuniformities were sufficiently small to hold reaction rates within range of 20%. Global rate equations for CO were developed which correlated oxidation rates with CO and O₂ concentration or with CO/O₂ and nitric oxide. Simulation computer models were developed in the area of steady operation and warm-up. A thermal conductivity-type hydrogen meter was constructed and tested. Also, the laser-schlieren technique was tested for measuring exhaust gas temperature and velocity.

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APTIC NO. 49315

Strauch, Dieter

HYGIENIC PROBLEMS CONNECTED WITH THE REMOVAL OF MUNICIPAL AND RURAL REFUSE SUBSTANCES. (Hygienische Probleme der Beseitigung kommunaler und landwirtschaftlicher Abfallstoffe). Text in German. Umweltforschung, no. 58:63-67, 1971. (Presented at the Seminar on Environmental Research, Hohenheim University, Stuttgart, West Germany, 1971.)

Many hygienic problems will have to be solved in connection with the removal of refuse and sewage sludge. When removing domestic refuse from deposit sites at the end of the day the deposited refuse must be covered with earth so that bad odors, low-temperature incendiaries, and germs are avoided. Bad odors which are caused by animal excrements can be avoided by chemicals in the form of masking, by covering, and by decomposition agents. Also technical methods like ozone, washing of the air, biological filters, or burning of the air can be used.

27592

APTIC NO. 49627

Thomson, John C.

A REPORT ON THE EXHAUST EMISSIONS FROM A TURBOCHARGED VOLKSWAGEN. Office of Air Programs, Research Triangle Park, N. C., Bureau of Mobile Source Pollution Control, Rept. 71-28, APTD-1415, 8p., May 1971.

The exhaust emission characteristics of a turbocharged car were studied to determine the effect of the turbocharger retrofit package on engine performance and emissions of

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hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The turbocharger installation had no adverse effect on emissions when properly installed and adjusted. Emission results on the turbocharged vehicle with performance optimized were above present standards; after proper adjustments, the vehicle would meet 1972-1974 emission standards. The turbocharger system considerably improved the performance of the engine.

27593

APTIC NO. 49629

Thomson, John C.

EXHAUST EMISSIONS FROM THREE LOW-EMISSION VEHICLES USING CATALYTIC CONVERTERS. *Air Pollution Control Office, Div. of Motor Vehicle Research and Development, Rept. 71-19, APTD-1424, 7p., Jan. 1971.*

The exhaust emission characteristics of three prototype low-emission vehicles were tested to determine the effects of various modifications on emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. Vehicle One used a modified choke system, exhaust gas recirculation, air injection, a charcoal canister to collect unburned hydrocarbons, and a single catalytic reactor for the oxidation of exhaust hydrocarbons and CO. Vehicle Two also had a modified choke, exhaust gas recirculation, air injection, two catalytic reactors for the reduction of NO_x and the oxidation of hydrocarbons and CO, and special controls to reduce ammonia. Vehicle Three used similar choke modifications and exhaust gas recirculation and was equipped with air injection and a catalytic reactor. All vehicles were tested on a low octane lead-free fuel. Vehicle One had the lowest emission values but could not meet the 1975 standards consistently. None of the vehicles met the NO_x emission requirement.

27594

APTIC NO. 49631

Thomson, John C.

EMISSION RESULTS FROM A TEXACO CATALYST CONCEPT APPLIED TO A PREVIOUSLY UNCONTROLLED ENGINE. *Air Pollution Control Office, Mobile Source Pollution Control Program, Rept. 71-26, APTD-1417, 6p., April 1971.*

The exhaust emission characteristics of a car equipped with an internal gas recirculation system, an air pump, and a catalytic reactor were studied to determine the effect of the modifications on emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. The vehicle did not meet the 1975 standards although it easily passed the 1972-1974 levels. The majority of the hydrocarbons and CO were formed during the cold portion of the test, while the NO_x was relatively unaffected by either cold or hot start.

27595

APTIC NO. 49685

Thomson, John C.

EXHAUST EMISSIONS FROM CONTROLLED AND UNCONTROLLED VEHICLES USING THE POLLUTION MASTER EMISSION CONTROL DEVICE. *Environmental Protection Agency, Office of Air Programs, Rept. 72-1, APTD-1411, 32p., Aug. 1971.*

The exhaust emission characteristics of cars equipped with pollution master devices were compared with uncontrolled cars to determine the effects of the device on fuel usage and emissions of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen dioxide. The pollution master is a two part system containing an exhaust scavenger and a crankcase scavenger. The effect of this device is to admit additional air to the manifold and thus give a leaner air-fuel mixture. Emission reductions using the device were minimal; equivalent results could be obtained by using a very lean idle setting. The device had no significant effect on fuel economy.

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APTIC NO. 49686

Thomson, John C.

EXHAUST EMISSIONS FROM A 1971 PASSENGER CAR EQUIPPED WITH THE PASER MAGNUM ELECTRONIC ANTI-POLLUTION ENGINE ECONOMIZER. *Office of Air Programs, Research Triangle Park, N. C., Bureau of Mobile Source Pollution Control, Rept. 71-31, APTD-1412, 5p., June 1971.*

The exhaust emission characteristics of a passenger car equipped with the Paser Magnum electronic device were studied to determine the effect of the device on emissions of hydrocarbons, carbon monoxide, and nitrogen oxides. The Paser Magnum had no measurable effect on exhaust emissions or any other operating parameter.

27597

APTIC NO. 49688

Thomson, John C.

EXHAUST EMISSIONS FROM AN ARMY M-151 EQUIPPED WITH A MITSUI CATALYST. *Air Pollution Control Office, Mobile Source Pollution Control Program, Rept. 71-22, APTD-1421, 6p., March 1971.*

The exhaust emission characteristics of a standard Army vehicle equipped with a catalytic exhaust reactor were studied to determine the effect of the device on emissions of hydrocarbons, carbon monoxide, and nitrogen oxides. The catalyst effected emission reductions after it reached effective temperature, but achieving the temperature took a long time. The most effective temperature for reduction was near the maximum temperature of the catalyst.

27598

APTIC NO. 49972

Wolf, Friedrich and Richard Reisdorf

THE ADSORPTION BEHAVIOR OF AMMONIA, DIFFERENT AMINES, AND CARBON MONOXIDE ON MODIFIED CRYSTALLINE 13 X TYPE ZEOLITES. (*Das Adsorptionsverhalten von Ammoniak, verschiedenen Aminen und Kohlenmonoxid an modifizierten kristallinen Zeolithen des Typs 13 X*). Text in German. *Z. Chem.*, 11(7):265-267, July 1971. 1 ref.

The adsorption of watery solutions of ammonia, ethylamine, propylamine, butylamine, i-butylamine, amylamine, diethylamine, triethylamine, ethylene diamine, ethanolamine, and carbon monoxide was studied experimentally on crystalline 13 X type zeolites with particle diameters of 0.0036 mm, modified with cobalt, nickel, manganese, and silver. The adsorption temperature was 20 C in all experiments. The adsorption capacity increased with the cation concentration in the molecular sieve in the succession cobalt, nickel, manganese. The adsorption capacity of the same type of modified zeolite decreased in the succession ammonia, ethylamine, propylamine, n-butylamine, i-butylamine, amylamine, diethylamine, and triethylamine, which is most probably due to changes in the steric structure and in the dipole moments. The adsorption process is completed within 24 hr. Partial substitution of heavy metal cations under the formation of chelate complexes by ethanolamine and ethylene diamine was observed. Zeolite with 32% manganese or 25% silver was best for the adsorption of CO in propane as a carrier gas under dynamic conditions in a column.

1970

27599

APTIC NO. 49694

Gompf, Henry L.

EXHAUST EMISSIONS FROM A PASSENGER CAR EQUIPPED WITH THE BIAP ELECTRONIC IGNITION UNIT. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-7, APTD-1435, 3p., Sept. 1970.*

CONTROL METHODS

The exhaust emission characteristics of a used car equipped with an electronic ignition device were examined to determine the effect of this device on emissions of carbon monoxide, hydrocarbons, and nitrogen oxides. Using the constant volume sampling test procedure, increases in hydrocarbons, CO, and NOx were determined. With the 1972 Federal test procedure, CO and NOx increased and hydrocarbons decreased. The ignition unit, therefore, had no positive effect on exhaust emissions.

27600

APTIC NO. 49895

Gustavsson, Karl Axel Goran

GAS-PURIFYING APPARATUS. (*Verfahren und Vorrichtung zur Reinigung von Gasen*). Text in German. (Aktiebolaget Bahco Ventilation, Enkoping (Sweden)) W. Ger. Pat. Appl. 2,050,906. 9p. Oct 16, 1970. (6 claims).

A powdered adsorbent is introduced into the feed gas stream and distributed over the surface of a moving belt filter in the path of the gas stream. The adsorbent particles together with aerosols present in the gas stream are deposited on the filter in a uniform layer while gaseous contaminants are adsorbed. The spent adsorbent is continuously removed by the belt and replaced by a fresh adsorbent layer. The adsorbent powder is transported to the lower end of the revolving belt where it is removed by a jet of air directed against that part of the belt and falls into a collecting hopper forming the bottom of the housing. The adsorbent is fed into the gas stream from a feed hopper containing a mill for fine grinding of the adsorbent recirculated from the collecting hopper. The feed hopper is placed on top of the feed duct connected with the top of the housing through which the gas stream enters the apparatus. This arrangement will separate gases like sulfur dioxide and hydrogen sulfide from aerosols like soot, and sulfur trioxide from crude process gases. Different adsorbents can be used including metal oxides (which are reground in the feed hopper), activated carbon, and diatomaceous earth (which are not reground). The purified gas is removed by an outlet duct from the inner space completely enclosed by the walls and the endless belt.

27601

APTIC NO. 49804

Nikiforov, I. N., Ye. N. Afanasyeva, I. P. Lyublner, and I. N. Yermolenko

NEW SORBENT FOR AMMONIA VAPOR FILTERS. (*Novyy sorbiryushchiy material dlya filtrov, zashchishchayushchikh ot parov ammiaka*). Text in Russian. *Nauch. Rab. Inst. Okhr. Tr. Vses. Tsent. Sov. Prof. Soyuzov*, no. 66:76-79, 1970. 8 refs.

An acidic cellulose phosphate-base absorbent was used as a fibrous filter material for gas-masks intended for use in ammonia vapor-contaminated atmosphere. The dynamic activity of the fibrous sorbent was dependent on the volume and layer thickness as well as on the textile structure of the filter. Fibrous sorbents in the form of nonwoven material and gauze can be used for the protection against low ammonia concentrations which may substantially exceed the maximum allowable value. Such sorbents can be regenerated by means of 0.5% hydrochloric acid.

27602

APTIC NO. 49690

Thomson, John C.

EXHAUST EMISSIONS FROM A PASSENGER CAR EQUIPPED WITH THE PASER MAGNUM ELECTRONIC ANTI-POLLUTION ENGINE ECONOMIZER. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-6, APTD-1436, 3p., Sept. 1970.*

The exhaust emission characteristics of a used car equipped with an electronic anti-pollution engine economizer were tested to determine the effect of the device on emissions of hydrocarbons, nitrogen oxides, and carbon monoxide. The

Paser Magnum had no significant effect on exhaust emissions or fuel economy over the driving cycle.

27603

APTIC NO. 49692

Thomson, John C.

AN EVALUATION OF A VARIABLE CAM TIMING TECHNIQUE AS A CONTROL METHOD FOR OXIDES OF NITROGEN. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-11, APTD-1431, 5p., Oct. 1970. 1 ref.*

The exhaust emission characteristics of a car equipped with camshaft timing device were investigated to determine the effects of this device on emissions of carbon monoxide, hydrocarbons, and, particularly, nitrogen oxides. The device allows internal gas recirculation through variable camshaft timing. The variable cam timing had a beneficial effect on the control of NOx without increasing the emissions of hydrocarbons or CO. The use of the device alone, however, could not meet 1973 emission levels except for NOx.

27604

APTIC NO. 49693

Thomson, John C.

EXHAUST EMISSIONS ON AN UNCONTROLLED PASSENGER CAR USING VARIABLE CAM TIMING. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-4, APTD-1437, 4p., Aug. 1970.*

The exhaust emission characteristics of an uncontrolled car equipped with a camshaft timing gear were measured to determine the effects of this device on emissions. For full test data, the engine was operated using both the stock carburetor and the special lean limit carburetor; exhaust content of hydrocarbons, nitrogen oxides, and carbon monoxide were measured for all cycles. With the lean carburetor and optimized ignition advance, hydrocarbon levels increased, CO levels decreased, and NOx values remained about constant. The use of the Varicam allowed ignition changes without adverse effects on driveability. The Varicam could be optimized for relatively low emissions.

27605

APTIC NO. 49853

Tsunemi, Masaaki

TRENDS IN CATALYST DEVELOPMENT. 3. CATALYSTS FOR PURIFICATION OF NON-LEADED GASOLINE AUTOMOBILE EXHAUST GASES. (*Shokubai kaihatsu no hoko 3. Jidosha haigaku jokayo to muenka gasorin-yo no shokubai*). Text in Japanese. *Kogyo Reametarū (Ind. Rare Metal)*, no. 45:17-21, 1970.

Some of the requirements for catalysts for automotive exhaust gases are their capacities for a complete neutralization of hydrocarbons and carbon monoxide, for stability of effectiveness, for complete oxidation, for a large oxidation activity at a low temperature, for the long-lasting stability of activity under high temperatures, for the stability of activity under the toxic influences such as lead, halogen, sulfur, and phosphorus compounds, and for great mechanical strength, longevity, low cost, and no damaging influence on the engine performance. The most frequently used metals in the U. S., English, and Japanese patent applications are, in order of frequency, copper, manganese, chromium, platinum, paradium, cobalt, iron, nickel, vanadium, and silver. Generally, while the catalysts are new, 60 to 80% of the hydrocarbons can be eliminated from the exhaust gas, but after 10,000 miles of operation, the ratio often deteriorates to 20 to 40%. The problem in the often advocated use of non-leaded gasoline is the catalyst for the platformer, which includes 0.3 to 0.7% of platinum. Presently, the final concentration of HC and CO content in exhaust gas are, with treatment by an engine improvement, 100 ppm of HC and 0.8% of CO; by manifold reactors, 50 ppm of HC and 0.8% of CO by the catalytic method, 50 ppm of HC and 0.5% of CO. However, in the 1975

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standard, the maximum allowable concentrations for automobiles (in the United States) are 0.4 to 0.5% of CO and 50 to 60 ppm of HC. The use of non-leaded gasoline presents many unsolved problems.

27606

APTIC NO. 49696

Verrelli, Leonard D.

EXHAUST EMISSIONS FROM A PASSENGER CAR EQUIPPED WITH THE WILFORD SMOG SUPPRESSOR. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-9, APTD- 1433, 2p., Oct. 1970.*

The exhaust emission characteristics of a passenger car equipped with a smog suppressor device were investigated to determine the effects of the device on emissions of hydrocarbons, carbon monoxide, and nitrogen oxides. The device consisted of a calibrated spring controlled flapper valve to vary the back pressure depending on engine rpm. The device had no significant effect on CO and NO_x emissions and increased the amount of unburned hydrocarbons emitted.

1969

27607

APTIC NO. 49864

Drysz, P., E. Nycz, and W. Paszek

ANALOG MODEL SIMULATING PHENOMENA OCCURRING DURING THE OPERATION OF ELECTRICAL PRECIPITATOR CHAMBER. *Air Conserv. (English translation from Polish of: Ochrona Powietrza), 3(2):15-22, 1969, 5 refs.*

NTIS: TT 70-55123/2

The analytical representation of the current-voltage characteristics of electrostatic precipitators is discussed. A new non-linear approximation can be applied in selecting component parts of the analog model of the precipitator. A practical realization of an analog model to simulate the operation of an electrostatic precipitator was designed on the basis of tests results of the performance of precipitators. Physical phenomena occurring during the removal of dust from gases in the electrostatic precipitator include the charging and discharging process, the electric corona, resistance, and partial arc discharges appearing during gas dedusting.

27608

APTIC NO. 49543

Nishino, Akira and Katsumi Yamamoto

METAL MATERIAL OF DESULFURIZATION DEVICE. (*Datsuiyu sochi no kinzoku zairyo*). Text in Japanese. *Sekiyu Gakkai-shi (J. Japan Petroleum Inst., Tokyo), 12(6):450-456, June 1969, 31 refs.*

Various metal materials used in a hydrosulfurization device were examined for corrosion including stress corrosion cracking under the varying operating conditions. Corrosion involving the hydrosulfurization of petroleum was classified into three categories: the dry high-temperature sulfur atmosphere with temperature of 280-450 C, pressure of 10-160 kg/sq cm, and hydrogen sulfide of 5-10 vol%; the dry and wet low-temperature sulfur atmosphere with temperature of 270 C or below, pressure of 10-160 kg/sq cm, and hydrogen sulfide of 10-20 vol%; the high-temperature, low-pressure sulfur atmosphere with temperature of 400 C or below, pressure of 5 kg/sq cm or lower, and hydrogen sulfide of 5-10 vol%. The various component units of the desulfurization system such as high-pressure and low-pressure containers, pipelines, heating furnaces, and heat exchangers placed under these three categories of the corrosion environment were inspected for possible corrosion damage inflicted during the operation. For example, a unit construction hot-wall type high-pressure container (such as the reaction tower or separator tank) made of the tempered chrome-molybdenum steel with a padded coating of stainless steel often suffers from sulfide stress corrosion

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cracking, peel-off of the coating due to high-pressure hydrogen, heat fatigue cracking of the coating, and damage by hydrogen of the base metal when used under the atmosphere. Main construction metals of the desulfurization system and their corrosion damage under these corrosion environments were listed. Detailed discussions of the dry and wet corrosion and of the sulfide stress corrosion cracking of austenite stainless steel were individually taken up with the related test data shown. Problems of the metal materials were also discussed in detail.

27609

APTIC NO. 49467

Ramadan, Omar Elhadi

ELECTROHYDRODYNAMIC SECONDARY FLOW. *Illinois Univ., Urbana, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1969, 351p. 25 refs.*

Electrohydrodynamic secondary flow was studied with particular reference to conditions prevailing in electrostatic precipitators. The secondary flow appears to be circulating in loops in the space between the neighboring wires and the conducting wall. This circulating motion near the plates sweeps some of the particles back in the flow and so the collecting efficiency is reduced. In an improved electro-aerodynamic precipitator, the electric wind direction is aligned with the direction of the gas flow so they do not interfere with the collection of particles. The charged suspension of smoke particles in the system has a negligible effect on the corona current because of its small mobility compared with the ions in the gas. The theoretical results of density distributions show that convergence of the perturbation method exists for practical ranges of physical parameters. Higher orders should be checked in new design ranges. The method for calculating secondary flow profiles makes use of the symmetry property along the centerline of the duct, giving a useful description of the secondary flow induced by the electrical wind. The experimental evidence of the particle density distribution reveals that a sharp decrease takes place beyond the positively charged wire and no such decrease when the wire was negatively charged. This is because the external field has a far greater influence than the self field. The flow velocity of the streams of particles fluctuated and the frequency of the fluctuations increased with the increase of the applied voltage. This method is well suited for investigating other configurations of the electrostatic precipitator, such as those illustrated for which the primary potential distribution has already been calculated.

27610

APTIC NO. 49473

Ziesse, Norman G.

THE DEPOSITION OF FINE AIRBORNE PARTICULATES ON ENVIRONMENTAL SURFACES. *Carnegie Mellon Univ., Pittsburgh, Pa., Dept. of Electrical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1969, 193p. 33 refs.*

A first stage of a research project aimed at quantitatively relating the parameters which influence particle deposition is presented. The study is directed toward the evaluation of air cleaning systems. The primary subjects treated are thermal and electrical deposition of fine particles which are negligibly influenced by gravity. Equations are proposed to specify relative thermal and electrical deposition rates on a vertical wall in terms of the temperature gradient and electric field at the wall surface. Constants for the equations are determined through laboratory experiments. The equations describing electrical deposition are applied to buildings in which air is cleaned by electrostatic precipitation. Particles escaping a precipitator generally carry a positive charge and can result in substantial electrical deposition. Both the charge carried by normal particulates and the charge carried by cigarette smoke are treated. Cigarette smoke carrying a net charge is possible if the smoked cigarette is at a different electrical potential from that of surrounding surfaces. Considerations on the benefit of installing an air cleaner in terms of the reduction in the particu-

CONTROL METHODS

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late deposition show that when an electrostatic precipitator is installed for the purpose of keeping walls clean, its efficiency must be high or the presence of charge in the room can cause surfaces to soil more quickly than with no air cleaner at all, even though the airborne particulate concentration is reduced. The importance of the different particle sizes in outdoor air on four particulate measurements (filter paper stains, forward light scattering by airborne particles, electrical charge carrying ability, and light scattering by particles deposited on a front surface mirror) was studied for developing methods for evaluating surface soiling rates.

1968

27611

APTIC NO. 49871

Masaru, Ishida and Shirai Takashi

INCINERATION OF CHICKEN DROPPINGS IN A FLUIDIZED-BED DEVICE. (*Ryudoso sochi ni yoru keifun no shokuyaku*). Kagaku Kogaku (Chem. Eng.), 32(5):71-76, 1968. 3 refs. (Presented at the Chemical Engineering Society, Autumn Congress, 1st, Osaka, Japan Oct. 1967.) Translated from Japanese, 15p.

A fluidized bed reactor with a mechanical stirrer was used for experiments in incinerating chicken droppings (0.25-2 kg/batch) containing large amounts of moisture (19.1-72.1%). The fluidized bed was 340 mm in inner diameter and 600 mm high; the side walls were insulated with castable refractories 70 mm thick. Air at room temperature was fed to the bed through a perforated plate to fluidize sand grains, and the stirrer blade was rotated. Next, a pre-ignited liquefied propane burner was lowered inside the fluidized bed and fastened in place. The liquefied propane flow rate was then set, and the amounts of primary and secondary air were adjusted to ensure complete combustion. Heating was continued until the prescribed temperature was attained. The effects of bed temperature (375-846 C), gas flow rate, fluidization velocity, and amount of chicken droppings injected on the combustion rate were determined. Test results confirmed theoretical studies showing that the combustion rate was directly proportional to the oxygen molar fraction and to the amount of unburned chicken droppings. The combustion rate constant tended to increase with an increase in bed temperature and gas flow rate, when sand grains had a greater minimum fluidization velocity, and when the amount of chicken droppings injected was small. The amount of moisture contained in the droppings did not have an appreciable effect on combustion. At bed temperatures below 500 C, the chemical reaction rate was almost linear, and the apparent activation energy was 13 kcal/mol; above 500 C, the effects of diffusion resistance were manifest. The combustion rate obtained from Orsat analysis of outlet gas coincided with the constant obtained from temperature variation curves when gas flow was assumed to be expelled flow.

27612

APTIC NO. 49894

Tupitsyn, Yu. K. and Yu. I. Danilevich

CLEANING WASTE GASES FROM THE PRODUCTION OF SYNTHETIC DETERGENTS BY A COMPLETE COMBUSTION METHOD. (*Ochistka otbrosnykh gazov proizvodstva sinteticheskikh moyushchikh sredstv metodom dozhiganiya*). Text in Russian Academy of Sciences. (Ukrainian SSR). Inst. of Gases, Ispol. z. Prir. Gaza Prom., Material. Nauch.-Tekhn. Knof. Molodykh Issled. Inst. Gaza Akad. Nauk UkrSSR, 1968, p. 284-287.

Pilot and full-scale equipment for the combustion of waste gases from the manufacturing of synthetic detergents are described. Small-scale equipment, a horizontal cylindrical combustion chamber, designed for the combustion of such waste gases with an organic content of 350-960 mg/cu m with natural gas, had an efficiency of 70-80%. An optimal combustion temperature of 700 C, and tangential admission were applied, the specific gas consumption being 0.027 cu m/cu m. Another full-scale piece of equipment handling 60,000 cu m of waste gas

with an organic carbon content of 1-3.66 mg/l/hr, is composed of two cyclone combustion chambers with vortex gas burners. Since the raw waste gas contains enough oxygen, no auxiliary air supply is necessary. The equipment has an efficiency of 70-80%, corresponding to a residual organic carbon content of 0.2-0.7 mg/l. The purified waste gas, leaving the combustion chamber at a temperature of 600-800 C, is mixed with 50,000 cu m of untreated waste gas before discharge across a 100-meter stack.

1967

27613

APTIC NO. 49833

Hetrick, Samuel Sanders

THE EFFECTS OF OXY-HYDROCARBON FUELS ON EXHAUST FROM SPARK-IGNITION ENGINES. Pennsylvania State Univ., University Park, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., March 1967, 331p. 262 refs.

The effects of alcohol addition to hydrocarbon fuels on the composition characteristics of exhaust gases from a spark-ignition engine during over-the-road testing were studied. The addition of methyl alcohol to the reference fuel used reduced both the hydrocarbon and carbon monoxide exhaust gas concentrations, and hourly emission rates on a weight basis. The methanol fuels require less oxygen for combustion, and at the same air to fuel ratio, burn effectively leaner. Therefore, methanol emission rates and oxides of nitrogen concentrations are increased due to high methanol fuel content and leaner combustion conditions, respectively. The hydrocarbon, nitrogen oxide, and major component concentrations in the exhaust gas are not dependent on the methanol fuel content for the conditions of idle, acceleration, and deceleration, with the same percentage of oxygen being available for the combustion. At cruise, the hydrocarbon concentration is noticeably reduced by increased methanol fuel content, while the concentrations of all other compounds are practically independent of fuel composition. The concentration reduction, which did not significantly reduce hourly emission rates, is dependent upon the hydrocarbon fuel composition. The performance of the engine was not noticeably affected by the use of alcohol-hydrocarbon fuels. With 25 vol% methanol fuel, about 12% increase in fuel consumption at cruising was observed. The data indicate that the use of alcohol fuel blends in an existing carburetor would probably result in lower hydrocarbon and CO exhaust emissions, but in increased nitrogen oxide concentrations and substantial alcohol emission rates, together with increased fuel consumption.

1963

27614

APTIC NO. 49481

Accomazzo, Mauro Anthony, Jr.

CATALYTIC OXIDATION OF LIGHT HYDROCARBONS AT LOW CONCENTRATIONS IN AIR BY A COPPER OXIDE-ALUMINA CATALYST (1:1). California Univ., Los Angeles, Dept. of Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1963, 121p. 37 refs.

The catalytic oxidation of light hydrocarbons including methane, ethane, ethylene, acetylene, propane, propylene, propyne, propadiene, and cyclopropane at low concentrations in air by copper oxide-alumina (1:1) catalyst was studied. The catalyst had a BET surface area of 86 sq m/g and a mean pore radius of 54 A. The hydrocarbon conversion was determined by means of a Carad flame ionization analyzer and detector. The oxidation was studied at initial hydrocarbon concentrations in the range of 182-1450 ppm, in the temperature range 140-510 C, and at gas flow rates of 160, 275, and 525 l/hr. The calculation of the conversion rates considered temperature gradients along the bed and external diffusion of reaction. The

predicted results agreed within 15% of the experimental results at the higher flow rates of 525 and 275 l/hr in the range of 10-80% conversion. At the lowest flow rate of 160 l/hr, the predicted conversions were considerably higher than the experimental results. Pore diffusion external and axial diffusion, and velocity profile across the bed had very little influence on the predicted results. Methane was the most difficult hydrocarbon to oxidize requiring temperatures greater than 400 C for appreciable conversion. Acetylene was least resistant to oxidation. Above 220 C, greater than 80% conversion was achieved. In general, increase in carbon number decreased the temperature necessary for a given conversion. For a given carbon number, the required temperature decreased with degree of saturation. A carbon dioxide mass balance indicated essentially complete hydrocarbon oxidation. The same catalyst bed was used for approximately 1000 hours with no apparent loss in activity detected.

1959

27615

APTIC NO. 49360

Ivanov, Yu V.

STATE OF THE ART. In: *Effective Combustion of Overfire Fuel Gases in Furnaces*. Tallin, USSR, Estonian State Publishing House, 1959, Chapt. 1. Translated from Russian. Little, (Arthur D.), Inc., Cambridge, Mass., p. 1-1 to 1-42.

Overfire air jets are widely used in both fuel bed furnaces and in furnaces which employ pulverized combustion, since they intensify the combustion process by increasing the heat release rate of the furnace volume and by effectively burning furnace gases. However, the mechanism by which overfire jets affect the mixing of the furnace gases remains unclear, and the lack of a reliable method for calculating the jets leads to their ineffective use. A survey of the literature revealed no agreement on such essential problems as the engineering and calculation of an overfire air jet; air consumption, pressure, and temperature; jet trajectory; size and number of nozzles; direction of the jets; spacing between jets; and whether the overfire air jet system should be from one or two walls. With the absence of adequate experimental and analytical data, a three-stage investigation was undertaken to determine the optimum engineering of an overfire air jet which will result in maximum mixing and consequently in complete burning of fuel gases above the fired bed in any furnace. The first stage was concerned with the laws of development of a single free jet, with a nozzle exit of circular, rectangular, or plane shape, in cross flow. In the second stage, the development of a single jet and a row of jets in a cross flow confined on four sides by solid walls was investigated. In the third stage, the interaction of an aggregate of jets with a confined cross flow was studied with respect to various design and operating parameters characterizing the phenomenon. Special attention was paid to mixing processes taking place in the primary cross flow when rows of jets in various combinations are introduced into it.

27616

APTIC NO. 49361

Ivanov, Yu V.

EXPERIMENTAL INVESTIGATION OF A FREE TURBULENT JET DEVELOPING IN A UNIFORM CROSS-FLOW. In: *Effective Combustion of Overfire Fuel Gases in Furnaces*. Tallin, USSR, Estonian State Publishing House, 1959, Chapter 2. Translated from Russian. Little, (Arthur D.), Inc., Cambridge, Mass., p. II-1 to II-129.

Experiments were conducted to determine the characteristics of: a circular isothermal or nonisothermal free turbulent jet of different exit parameters developing in a transverse homogeneous flow; a rectangular longitudinal and a rectangular transverse free jet of different equivalent exit parameters developing in a homogeneous cross flow; and a plane isothermal or nonisothermal free jet of different exit width developing in a uniform cross flow. The experiments were conducted by vary-

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ing the velocity ratios, the temperature ratios, and the angle of attack of the circular, rectangular, and plane jets. Generalized curves for the different shaped jets of any exit diameter were obtained by processing experimental data characterizing the damping of the axial velocity of the free jets of different diameters in relative coordinates including jet exit diameter and orifice shape factor. Equations based on a characteristic hydrodynamic parameter (the ratio of the velocity heads) were derived for calculating the trajectories of jets entering a uniform cross flow at a 90 deg angle or at different angles of attack. The difference between the trajectories of jets constructed in relative coordinates was a function only of the difference in the values of the characteristic hydrodynamic parameter.

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APTIC NO. 49362

Ivanov, Yu V.

EXPERIMENTAL INVESTIGATION OF AN OVERFIRE JET USING FURNACE MODELS WITH APPLICATION TO THE COMBUSTION OF FUELS IN A FUEL BED.

In: *Effective Combustion of Overfire Fuel Gases in Furnaces*. Tallin, USSR, Estonian State Publishing House, 1959, Chapt. 3. Translated from Russian. Little, (Arthur D.), Inc., Cambridge, Mass., p. III-1 to III-212.

The development of jets and the mixing of gases in a confined cross flow were investigated. Two systems of supply overfire air jets were examined, the one-wall system and the two wall-system. Similarly, the mixing of gases was investigated for two positions, near the front wall and above the middle part of the fuel bed. The experiments were conducted for various values of characteristic design and operating parameters. Trajectories of a single jet developing in a confined cross flow corresponded, within limits, to trajectories of jets developing in free cross flow. Experiments with nonisothermal circular jets showed that for trajectories of a row of jets as well as for the axis of a single jet, the decisive hydrodynamic parameter was the ratio of velocity heads of primary gas flow and of the jet exit. The relative spacing between jets was the decisive design parameter in the mixing of overfire gases by circular overfire jets. The best mixing was obtained at a relative spacing equal to 4 mm or less. The influence of the angle of attack of an overfire air jet was also demonstrated, a change from 90 to 120 or 140 deg improved the mixing of the overfire gases. Experiments with plane jets as well as with circular jets, conducted with small values of relative spacing, showed that the formation of a continuous air current formed by converging jets promotes effective mixing of gases. The mixing of gases by rectangular longitudinal jets with equivalent diameters equal to those of the circular jets was practically identical to that of the circular jets. Thus other jets of regular exit shapes and identical equivalent diameters should produce approximately the same mixing of fuel gases in a furnace. Jets supplied from one wall and from the front of the furnace provided the most effective mixing of overfire gases.

27618

APTIC NO. 49363

Ivanov, Yu V.

METHOD OF CALCULATING OVERFIRE AIR JETS FOR FURNACES WITH STRATIFIED COMBUSTION GASES.

In: *Effective Combustion of Overfire Fuel Gases in Furnaces*. Tallin, USSR, Estonian State Publishing House, 1959, Chapt. 4. Translated from Russian. Little, (Arthur D.), Inc., Cambridge, Mass., p. IV-1 to IV-22.

A method of calculating overfire air jets for fuel-bed furnaces is presented. The method, which ensures effective combustion of overfire fuel gases, is based on calculating the following parameters of the overfire air jet: air temperature, relative spacing between nozzles, jet pressure and capacity, equivalent diameter of nozzles, shape of nozzle mouth, and dimensions of the plenum chamber. Examples are provided of overfire air jet calculations for unilateral systems in which air is introduced from the front. The examples involve furnaces with a

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productive capacity of 40, 35, or 18 tons of steam/hr, respectively.

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APTIC NO. 49364

Ivanov, Yu V.

APPENDICES: EXPERIMENTAL DATA FOR JETS DEVELOPING IN A TRANSVERSE FREE STREAM.

In: *Effective Combustion of Overfire Fuel Gases in Furnaces*. Tallin, USSR, Estonian State Publishing House, 1959. Translated from Russian. Little, (Arthur D.), Inc., Cambridge, Mass., P. A-1 to A-13.

Experimental data for jets developing in a transverse free stream are summarized in tabular form. The data cover the axial velocities of round, plane, rectangular transverse, and rectangular longitudinal jets and the axial temperatures of round and rectangular transverse jets.

1953

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APTIC NO. 49458

Humphrey, Arthur Earl

AIR STERILIZATION BY FIBROUS MEDIA. Columbia Univ., New York, Faculty of Pure Science, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1953, 126p. 48 refs.

Interception, diffusion, settling, inertia, and electrostatic mechanisms involved in fibrous filter operation with impaction effects were studied on 0.12 in. thick fibrous glass filters, and their efficiencies in removing *B. subtilis* spores from air streams were compared at various air velocities. Experimental results supported earlier theoretical considerations which indicated that air velocity would determine the effect of the various mechanisms. Tests with the glass filters showed that two opposing velocity effects operate separately within them. At high velocities the inertial mechanism, which is directly proportional to velocity, predominates; at low velocities diffusion and/or interception, which are inversely affected by velocity, are operating. Electrostatic forces can be important at low velocities but their magnitude depends upon the effective charge maintained on the fiber surface and the nature of the aerosol. At the point where inertial effects disappear there exists a velocity which gives rise to a minimum filtration efficiency. Recognition of the existence of this minimum efficiency at an intermediate velocity is important in sound filter design. Interception effects, those due to the finite size of the aerosol particle and the flow field pattern, are much smaller than predicted from theoretical calculations. The Ranz parameters do correctly characterize the inertial, electrostatic, and probably the settling mechanism. The interception mechanism, however, does not act as the Ranz parameter indicates it should. Economic considerations of filter operation in removing a certain percentage of *B. subtilis* spore indicates that low velocity filtrations are most desirable from the standpoint of filter life and pumping costs. Only in conditions where the filter size is limited or the initial equipment cost are appreciable is high velocity filtration recommended.

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1973

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APTIC NO. 49208

MOBILE AIR RESEARCH LABORATORY WITH COMPREHENSIVE CAPABILITY. *Ind. Heating*, 40(1):62-64, Jan. 1973.

A mobile air research laboratory is described which can measure and calibrate both ambient and smokestack concentrations of virtually any pollutant of interest. The laboratory is a

35 ft long van with a small utility area up front, a monitoring and gas conditioning area in the center, and a wet chemical laboratory in the rear. Devices are included to measure concentrations of chemical gases and amounts and particle sizes of microscopic dust particles. A special sensor is provided for odor evaluation. Stack samples are collected with a cable that plugs directly into the smoke stack. Ambient samples are taken from above the laboratory by means of a retractable tower and are drawn directly into monitoring instruments by a suction pump. The mobile laboratory also contains instruments for measuring wind speed and direction, temperature, dew point, solar radiation, and other weather factors.

27622

APTIC NO. 49760

Clarenburg, Louis A.

AIR POLLUTION MEASUREMENT AS A TOOL FOR PRACTICAL POLICY AND CONTROL STRATEGY.

Fresenius Z. Anal. Chem., 263(4):298-303, 1973, 11 refs. (Presented at Euroanalysis I Conference, Heidelberg, Germany, Aug. 28-Sept. 1, 1972.)

Air pollution problems, control methods, and analytical methods are discussed. Air monitoring is important for establishing standards for individual pollutants and in the future for establishing standards for air pollutant mixtures, and for forecasting air pollution episodes. The globally important pollutants such as carbon dioxide and DDT should be given first priority in air monitoring, followed by regional pollutants such as sulfur dioxide and the oxides of nitrogen and local pollutants such as various metals and oxidants. To show how air pollution data can be used for deriving practical policy, two examples are given. The first is related to the odor problem, the second is related to the SO₂ trends in a city.

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APTIC NO. 49276

Engels, Lothar-H. and Wilfried Luckey

MEASUREMENT FILTERS - PROPERTIES AND CAPACITY DATA. (Messfilter - Eigenschaften und Leistungsdaten). Text in German. *Staub, Reinhaltung Luft*, 33(1):39-40, Jan. 1973, 2 refs.

Particulate air pollutants in the atmospheric air, indoor air, and in flowing gases are measured with units which separate the particles by filters with or without preliminary separation. The latter is of advantage when a separation according to size during sampling is required, when the high dust concentration causes a too rapid increase of the pressure difference and thus a slow-down of the throughput, and when water droplets must be separated. According to VDI 2066 the following properties should be considered in the selection of filters: collection efficiency, throughput resistance, temperature resistance, resistance to humidity, chemical resistance, and mechanical strength. A total of 38 filters made of polystyrol, cellulose nitrate, cellulose asbestos, and glass were checked as to their suitability for measurements. Twenty-three of the filters had a collection efficiency of 99.5% or higher. The temperature resistance, average flow resistance, and weight for these 23 filters are listed in a table.

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APTIC NO. 49384

Hasegawa, Rumi

SIMPLE METHOD OF MONITORING OZONE UTILIZING A PIECE OF RUBBER. (Gomu o riyo shita kanishiki ozon monitaho). Text in Japanese. *PPM (Japan)*, 4(3):58-65, March 1973.

A new and simple method of determining the atmospheric ozone content has been developed in which a specified test piece of rubber is exposed to the atmosphere for 7 days under a gravitational tension of 360 g. The difference of elongation (mm) of the piece of rubber when pulled by the same tension before and after the exposure is measured. The measured difference represents the composite results of aging of rubber by ozone and is proportional to the atmospheric ozone content

measured by the neutral potassium iodide method and by the chemiluminescence method.

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APTIC NO. 49816

Hodgeson, J. A.

A REVIEW OF CHEMILUMINESCENT TECHNIQUES FOR AIR POLLUTION MONITORING. Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Div. of Chemistry and Physics, 29p., 1973 (?). 55 refs.

The principle of operation of chemiluminescence detectors, advantages, disadvantages, and applications are reviewed. The operating variables of chemiluminescence detection of ozone, nitric oxide, and sulfur compounds are examined. Detector variations and the potential application for monitoring sulfur dioxide, carbon monoxide, nitrogen oxides, ammonia, and phosphorus, boron, and halogen compounds are considered.

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APTIC NO. 49748

Homes, S.

THE MEASUREMENT OF ASBESTOS DUST. Staub, Reinhaltung Luft, 33(2):64-66, Feb. 1973.

Regulations are in force in the United Kingdom covering all operations in which asbestos dust can be generated. The Asbestosis Research Council has studied the problems involved and the measures needed to comply with these regulations. Reasonable precautions will ensure that reinforced plastic composites can be manufactured and processed with complete safety. The asbestos industry in the U. K. instituted a program of measurements of the asbestos concentration of general environmental atmospheres in the vicinity of its factories, and in selected urban and rural situations. It was quickly demonstrated that asbestos, if it was present at all, was present in such small quantities that the standard sampling instruments were completely inadequate. A high-speed sampler had to be used working on the principle of electrostatic precipitation and capable of sampling speeds up to 10,000/min of air. Even in these large volume samples, the estimation of the asbestos present has proved difficult. Where the total mass is above about 100 microgram, the X-ray diffraction method has been used. But in many samples collected, no asbestos has been detected by this method. In these cases it has been necessary to treat the sample by ultrasonics to disperse any asbestos present in its basic form and estimate the mass using transmission electron microscopy. This method is capable of measuring asbestos concentrations as low as of 10 to the minus 10th power g/cu m in a 1000 cu m sample, even in presence of excessive amounts of other airborne solids.

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APTIC NO. 49070

Inokoshi, Yukio, Masamichi Ikeda, Tatsuo Yamamoto, and Yoshiharu Shinozaki

MEASUREMENT OF NITRIC OXIDE BY CHEMILUMINESCENCE METHOD. (Kagaku hakkoho no yoru NO no sokutei). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 8(1):7-12, Jan. 1973. 3 refs.

Nitric oxide emits light caused by the reaction with ozone, and that the light intensity is linear to the NO concentration. Thus, a calibration method and detection limits were investigated with a specially designed apparatus equipped with a photomultiplier, whose temperature was controlled between room temperature and -25 C. A linear relationship was obtained between 100 ppm of about 3 ppb of NO, with the detection limit at room temperature and -25 C being 40 ppb and 3 ppb respectively. The effects of nitrogen dioxide, carbon monoxide, benzene, and toluene were also examined. The effects of CO, benzene, and toluene were negligible, but a minor effect was observed for NO₂. The chemiluminescence method was better than Saltzman's method for NO determination, and this apparatus can be applied for the examination of the commercial NO meter based on the same principle.

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APTIC NO. 49101

Kahn, Herbert

THE FLAME GETS COMPETITION. Ind. Res., 15(2):37-42, Feb. 1973.

Improved flameless sampling devices for atomic absorption spectrophotometric analysis of metallic elements are described. In a new general purpose device, a tantalum strip is placed in a closed chamber with fused silica windows, and is heated to incandescence by an electric current in an argon or argon-hydrogen atmosphere. Compared with flame devices, the sampler gives high sensitivity increases for at least 30 elements. Other widely used devices are based on the graphite furnace, which is basically a small hollow cylinder. The cylinder is heated by passing an electrical current through it in a sequence of three steps: a low temperature is used to dry the sample and a higher temperature to ash it before the cylinder is heated to incandescence, atomizing the sample. Detection limits are comparable with those of neutron activation. Deuterium arcs and hydrogen hollow cathodes are available for simultaneous and automatic background correction. Two other sampling devices are the ultrasonic nebulizer and the argon plasma jet, which is more suited for atomic emission than atomic absorption. Improved electrodeless discharge lamps may provide the bright light required for atomic fluorescence. This technique could provide better detection limits for many elements and would lend itself more readily than atomic absorption to simultaneous multi-element analysis.

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APTIC NO. 49177

Machata, G.

TRACE ANALYSIS OF METALS IN DUSTS AND BIOLOGICAL MATERIAL. (Spurennachweis von Metallen in Staeben und biologischem Material). Text in German. Zbl. Arbeitsmed., 23(1):4-6, 1973.

If regulations containing tolerance limits concerning air pollution are passed, the necessary analytical methods must be available to determine any disobedience with the law. For instance, it is not enough to reduce the lead concentration in gasolines. The lead level in the blood of the population before and after the law went into effect must be also checked in order to determine the efficiency of such laws. A preliminary study of the lead level in the blood of the Viennese population revealed an average concentration of 25 micrograms lead/100 g blood in 40% of the examined people. Methods for trace analysis of metals in dusts and biological material are briefly discussed. For the wet-chemical analysis of metal traces at least 100 g of organic material are necessary. The detection limit is in the milligram range. By means of colorimetry .1-.01 mg can still be analyzed. Polarographic and radiographic fluorescence analyses require 10 g of sample material. The detection limit is the same as that of colorimetry. Atomic absorption analysis requires only 1 g of examination material, with a detection limit in the microgram range. Wet ashing is recommended for the analysis of temperature sensitive metals. The disadvantages of this method (time consuming and danger of introducing foreign matter) are known. Dry ashing is without problems except that for toxic metals such as lead, arsenic, mercury, thallium, and zinc greatest attention is necessary. The lead level in the Vienna was measured by atomic absorption with a graphite tube cuvette which required only 20 microliter of blood.

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APTIC NO. 49509

Shirasawa, Tadao

HARMFUL GAS MEASURING EQUIPMENT. (Yugai gasu sokutei kiki ni tsuite). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 25(2):77-83, Feb. 1973.

Measurement methods as described in Japanese Industrial Standards are discussed for sulfur oxides, nitrogen oxides, chlorine, hydrogen chloride, fluorine compounds, and hydrogen fluoride. Dust concentrations and lead and cadmium

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content in dust should be analyzed by polarography. Sulfur oxides are measured by electroconductivity (suitable for concentrations up to 10,000 ppm). Ultraviolet spectrometry can also be used to measure SO₂ up to 10,000 ppm. The Saltzman method and chemiluminescence can be used to measure nitrogen oxides. Ultraviolet spectrometry is suitable for nitric oxide up to 1000 ppm concentration.

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APTIC NO. 49623

Shirasawa, Tadao

SELECTION OF AIR POLLUTION GAUGES. (I). (*Taiki osen kankei no sokuteiki no sentaku. (I).*) Text in Japanese. Netsu Kanri to Kogei (Heat Management Public Nuisance), 25(1):69-77, Jan. 1973.

Gauges used for mine safety are subject to periodical checks before sale and after they have been in use. However, there is no check system for gauges which measure the degree of pollution, and there is no provision made as to their correct maintenance. Presently marketed gauges for pollution must be made to meet the requirements absolutely, since the result of measurements determines whether or not some factories should be in existence, and gravely affects human lives. There should be meters for what is emitted after electricity, water, fuel, and raw materials have been used, the same way, there are meters to gauge their volumes when received. If mass production of safe, reliable, and compact meters recording smoke, dust, and sulfur, can be made, and if it is made mandatory for all chimneys to be equipped with these meters, special charges for facilities to improve environment could be made by local government offices, after a monthly check of these meters. Measurement and analysis of the degree of pollution is only one of the means of preventing pollution and is never a sufficient means of prevention by itself. Some monitoring stations have adopted improved, wireless transmission system, communicating data by a telemeter system to a central monitoring station. Mobile wireless monitoring cars, mounted with various gauges, equipped with motors, are in operation in some areas. Some monitoring stations have a device by which lamps are switched on when a directive to switch to low sulfur oil is received and understood by factories. In some areas, a sulfur dioxide gauge, for the use of a pollution source, is attached to stacks, and the result is transmitted to a monitoring center, so that the switch to low sulfur oil can be checked (although an oxygen gauge is also necessary).

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APTIC NO. 49176

Sujak, B., A. Gierszynski, and Adam Sniegowski

THERMOLUMINESCENCE OF RESPIRABLE DUSTS FROM COPPER MINES. (*Thermolumineszenz von atembaren Staeben aus Keuper-Gruben.*) Text in German. Staub, Reinhaltung Luft, 33(1):8-10, Jan. 1973. 10 refs.

A method for the measurement of the thermoluminescence of respirable dusts at low temperatures is described. A photomultiplier was used whose spectral sensitivity ranged from 3000 to 8000 Å. The photomultiplier counted the individual ultraviolet light impulses with an operating voltage of 168 volt. The respirable dust was separated from the total dust by a standard horizontal dust collector. In a cylinder rotating with a speed of 7000 rpm the respirable dust passing the horizontal separator was collected. The quartz concentration in the respirable dust varied between 5.5 and 15.4%. The dust samples together with an ultraviolet mercury-high pressure lamp and the photomultiplier were arranged in a vacuum chamber which permitted the cooling of the samples down to 100 K. In the interior of the sample carrier an electric heater (50 watt) was installed for heating the dust samples during the thermoluminescence measurements. The heating rate was constant and amounted to 0.6 K/min. The intensity of the thermoluminescence was influenced by the duration of the thermal treatment. With shorter thermal treatment the intensity dropped. With increasing excitation time the magnitude of the thermoluminescence maxima increased. In a similar manner the maxima were in-

fluenced by the intensity of the exciting light. A linear relationship was found between the size of the surface of the luminescent dust and the magnitude of the thermoluminescence maxima. The weight of the samples (between 6 to 100 mg) had no influence on the thermoluminescence maxima.

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APTIC NO. 49244

Terabe, Motoji

AIR MONITORING TECHNOLOGY FOR SOME GASEOUS POLLUTANTS. (*Taiki osen no keisoku ni suite.*) Text in Japanese. Nenryo Kyokaiishi (J. Fuel Soc. Japan, Tokyo), 52(549):24-35, Jan. 1973. 9 refs.

Air monitoring methods employed in Japan are compared to the National Air Quality Standards Reference Methods of the USA. According to the Japan Air Pollution Prevention methods, sulfur oxides are determined by the solution conductivity method particulates by the light-scattering method, carbon monoxide by infrared spectrometry, nitrogen dioxide by the Saltzman method, and oxidants by the colorimetric method using potassium iodide or bromide solution. In the USA, SO₂, particulates, CO, ozone, and NO₂ are determined by the pararosaniline method, the high-volume sampler, the infrared method, chemiluminescence, and the colorimetric method using an alkali solution, respectively. The difference of the results by the solution conductivity method and the pararosaniline method were partly due to the evaporation loss of absorbent.

1972

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APTIC NO. 49278

Japan Environmental Agency

TECHNIQUES OF MEASUREMENT OF VAPOR PHASE PCB. (*Kiso PCB sokutei yoryo.*) Text in Japanese. p. 64-71, Dec. 5, 1972.

Details of polychlorinated biphenyl (PCB) sampling and analysis are given. The PCB sample is usually collected by a solvent absorption method using n-hexane as the solvent with the aid of a push-in type pump. About 1.5 l of the sample solution is concentrated at room temperature and reduced pressure to approximately 10 ml. About 200 ml of the concentrated solution is then heated with 50 ml of 1 N sodium hydroxide ethanol solution for 1 hr. The solution is extracted with n-hexane after cooling, and the n-hexane extract is passed through a glass column 30 cm long and 2 cm inside diameter packed with a 1-1.5 cm long upper layer of anhydrous sodium sulfate and a 15 cm long lower layer of Fluorosil. About 300 ml of ethyl ether-n-hexane solution is then added from the top of the column. The eluate is concentrated in the same way as stated previously, and the concentrated solution is analyzed with gas chromatography with OV-1 as the column stationary phase and Gas Chrom Q, Chromosob G, or Chromosob W as the column supporter.

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APTIC NO. 49752

Japan Environmental Agency

INSTRUCTIONS FOR AIR QUALITY MEASUREMENTS AND OTHER ENVIRONMENTAL INVESTIGATIONS. (*Kankyo taiki chosa sokutei hoho nado shishin.*) Text in Japanese. 58p., Aug. 1972.

Instructions for sampling and measuring methods of air pollutants are given. Sulfur oxides in the air are collected in a 0.006% hydrogen peroxide aqueous solution having a sulfuric acid concentration of .0001 N, and the concentration is measured by the conductivity method. Carbon monoxide and hydrocarbons are collected using a Mylar bag and are determined by infrared spectrometry and flame ionization, respectively. Airborne soot, and particulates including sulfate ion, nitrate ion, organic compounds, and metals are collected by a high-volume or low-volume sampler. Sulfate and nitrate are determined by the spectrophotometric method. Organic com-

pounds are determined by the gravimetric method, and metals are determined by the atomic absorption method. Gaseous and granular fluorides are collected and separated by two-stage filters, a millipore filter, and a millipore filter impregnated with 1% sodium carbonate; they are determined by the fluoride ion electrode method or colorimetric method. Nitrogen oxides are collected in an absorbing solution prepared by dissolving 5 g of sulfanilic acid and 140 g of glacial acetic acid in 900 ml of water and adding to it 20 ml of 0.1% aqueous solution of N-(1-naphthyl)-ethylenediamine hydrochloride followed by dilution with water to 1 l and by determination by the colorimetric method.

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APTIC NO. 49837

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Kommission Reinhaltung der Luft and VDI (Verein Deutscher Ingenieure, Duesseldorf (West Germany), Fachgruppe Staubtechnik

MEASURING PARTICLES IN ATMOSPHERIC AIR. A SURVEY. (Messen von Partikeln in der Aussenluft. Uebersicht.) Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 2463(1):1-6, April 1972. 18 refs.

Principles and guidelines for the measurement of particulate matter in the atmosphere are presented. Since isokinetic sampling conditions cannot be usually secured for measurements of the mass and particle count concentrations, concentration changes in the sample volume relative to the original gas are unavoidable. The sampling efficiency is strongly dependent on the particle size, which influences the precision of mass concentration measurements, especially of coarse particles. When coarse particles should be excluded from the determination, laminar flow in the sampler should be applied to allow time for sedimentation. The separation of the particles to be analyzed is done by sedimentation or different methods of precipitation. Glass, polystyrene, cellulose, and cellulose-asbestos fiber filters are used for the collection of particulate matter, with a minimum required retention of 99.5%. The accuracy of gravimetric determinations can be enhanced by eliminating or reducing sorption and desorption processes as well as electrostatic charging before, during and after sampling. The reference volume, determined by the chamber or flow rate method, should be within a 10% limit of the nominal suction volume.

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APTIC NO. 49906

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Kommission Reinhaltung der Luft

MEASUREMENT OF DUST FALL BY MEANS OF COLLECTION PLATE. (Messung partikelfoermiger Niederschlaege. Bestimmung des partikelfoermigen Niederschlags mit Haftfolien.) Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 2119(4):1-3, June 1972. 6 refs.

The measurement of dust fall by means of a collection plate, a sampling method suitable for gravimetric determination and microscopic investigation alike, is described. Aluminum foils with the dimensions of 49 mm by 83 mm are coated with a 0.2 mm layer of pure vaseline warmed to 40 C to obtain a smooth surface. The collection plate thus obtained is exposed at a height of 1.50-2 m above the ground usually over 7 days in order not to exceed a sample quantity of 30 mg per foil. The foils to be evaluated are dried at 40 C over 2 hr for gravimetric determination. The lower limit of detectability is 0.4 mg per foil or 0.02 g/sq m/day, the standard deviation being 0.03 g/sq m/day. The collection plate method is especially suitable for studies of the influence on the dust fall of single emission sources and of specific meteorological conditions.

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APTIC NO. 49958

HIGH-SENSITIVITY CHEMILUMINESCENT GAS ANALYZER. (Hochempfindlicher Chemolumineszenz-Gasanalysator.) Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), no. 8:560, June 1972. 1 ref.

AIR POLLUTION ABSTRACTS, JUNE 1973

A highly sensitive chemiluminescent gas analyzer model 10 A from the Thermo Electron Corporation is described. The instrument is designed to measure nitrogen oxide concentrations in eight different ranges from 0-1000 ppm by detecting the chemiluminescent radiation in a wave length range of 0.6-3 micron, generated by nitrogen dioxide formed in the reaction of nitric oxide with ozone. The instrument, having an error of 3% for the 0-0.01 ppm range, and 1% for the rest of the measuring ranges, is suitable for NO concentration measurements in automotive exhaust gases, and for continuous air pollution monitoring purposes.

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APTIC NO. 49215

Aydarov, T. K., A. Kh. Razyapov and O. B. Znamenskaya

SPECTROCHEMICAL METHODS IN THE DETERMINATION OF BERYLLIUM IN AIR, WATER, AND BIOLOGICAL SAMPLES. (Spektralnyye metody opredeleniya berilliya v vozdukh, vode i biomaterialakh.) Text in Russian. Gigiena i Sanit., no. 11:83-85, 1972. 12 refs.

Various spectrochemical methods available for the determination of beryllium in air, water, and biomasses, are reviewed and evaluated. Spectrographic analyses with air sampling by filter, and investigations of the concentrate are both time-consuming and delicate. The direct determination of beryllium by passing the air sample through a discharge gap of the light source with a photoelectric spectral recording constitutes a rapid method of sufficient sensitivity and accuracy. Atomic absorption and fluorescent spectrophotometric methods are superior to emission spectrography regarding sensitivity and accuracy in the determination of beryllium in solutions and other liquids.

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APTIC NO. 49140

Baker, A. D., C. R. Brundle, and M. Thompson

ELECTRON SPECTROSCOPY. Chem. Soc. Rev., 1(3):355-380, 1972. 89 refs.

Electron spectroscopy involves the study of electrons emitted when matter is irradiated with photons or particles. The technique encompasses the following closely related but distinct branches: ultraviolet photoelectron spectroscopy, electron spectroscopy for chemical analysis (i.e., X-ray photoelectron spectroscopy), Penning ionization spectroscopy, Auger spectroscopy, ion neutralization spectroscopy, and electron impact energy loss spectroscopy. The principles of these techniques and the information that can be derived from them are discussed. Both ultraviolet photoelectron spectroscopy (PES) and electron spectroscopy for chemical analysis (ESCA) have considerable potential as tools for the analytical chemist. As the PES spectra of structurally similar compounds are often quite different, the technique can be used to give qualitative or fingerprint information. In principle, quantitative measurements are possible as electron count-rates are functions of the number of molecules. Analysis of mixtures of compounds is also a possibility. The main use of ESCA is now in the mapping of elements in solid surfaces. Once sufficient information is available for multiple-atom correlations, ESCA will become a complementary tool to infrared, nuclear magnetic resonance, and mass spectroscopy. Electron impact energy loss spectroscopy is a potential tool for the analysis of gases and vapors, and in particular for the determination of trace contaminants in the atmosphere.

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APTIC NO. 49127

Bartle, K. D.

THE STRUCTURE AND COMPOSITION OF COAL TAR AND PITCH. Rev. Pure Appl. Chem., vol. 22:79-113, Sept. 1972. 360 refs.

The structure and composition of coal tar and pitch were determined by a variety of analytical techniques. The operating variables are defined for analysis by solvent fractionation,

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gel-permeation chromatography, molar volume schemes, refractive index/density/ molecular weight schemes, high resolution nuclear magnetic resonance, mass spectrometry, infrared spectroscopy, proton magnetic resonance, electron spin resonance, and gas and liquid chromatography. Complete analytical data and mathematical calculations are included. The pitch from high-temperature coal tars was analyzed and consisted of a variety of hydrocarbons and sulfur and nitrogen compounds.

27642

APTIC NO. 49732

Berglund, Birgitta, Thomas Lindvall, Ulf Berglund, and Leif T. Svenson

A QUANTITATIVE PRINCIPLE OF PERCEIVED INTENSITY SUMMATION IN ODOR MIXTURES. *Stockholm Univ. (Sweden), Psychological Labs., Rept. 346, 15p., March 1972. 24 refs.*

The summation principle for perceived intensity of odors was investigated for mixtures of dimethyl disulfide, hydrogen sulfide, and pyridine. The mixtures were made by forming all possible pairs of these three compounds each appearing at five levels of perceived intensity. The single odorants and the mixtures were scaled with regard to perceived intensity with a magnitude estimation procedure. The theoretical values calculated according to a vector model of odor interaction were in good agreement with the empirically obtained perceived intensity values of the mixtures for all odorants mixed. For components equal in perceived intensity, a direct proportionality between the perceived intensity of the mixture and the arithmetic sum of the perceived intensity of the components was found. This result, which conformed with a special case of the vector model, was in agreement with earlier reported findings. It is possible to predict the perceived intensity of all possible combinations of two odors knowing only how they mix when they are equal in perceived intensity. Different features of the results from the present experiment are also discussed in relation to earlier reported odor mixture phenomena. (Author abstract)

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APTIC NO. 49353

Birks, L. S., J. V. Gilfrich, and P. G. Burkhalter

DEVELOPMENT OF X-RAY FLUORESCENCE SPECTROSCOPY FOR ELEMENTAL ANALYSIS OF PARTICULATE MATTER IN THE ATMOSPHERE AND IN SOURCE EMISSIONS. *Naval Research Lab., Washington, D. C., National Environmental Research Center Interagency agreement 690114, EPA-R2-72-063, 46p., Nov. 1972. 13 refs.*

NTIS: PB 213366

The elemental analysis of air pollution particulate samples from ambient air or from emission sources by X-ray fluorescence spectrometry was investigated. Standards for quantitative analysis determined gravimetrically and the experimental approach are reviewed. The advantages of analyzing particulates by X-ray fluorescence spectrometry are discussed. Sensitivity and detectability were compared for four types of excitation - X-ray tubes, fluorescers, radioisotopes, and high-energy ions - and for the two types of data acquisition (crystal spectrometers and energy dispersive detectors). The X-ray analysis of real pollution samples showed concentrations for elements of interest between 50 ng/sq cm and 300 micrograms/sq cm. Represented among these samples were particulates filtered from auto exhaust, municipal incinerators, a power plant, and a cement plant. Filter material, the fundamentals of X-ray fluorescence analysis, and the preparation of calibration standards were reviewed.

27644

APTIC NO. 49489

Boiteau, H.-L., M. Robin, and S. Gelot

IDENTIFICATION AND MICRODETERMINATION OF POLYCYCLIC HYDROCARBONS BY IR SPEC-

TROMETRY. (*Identification et microdosage des hydrocarbures polycycliques par spectrometrie infrarouge*). Text in French. *J. Eur. Toxicol., 5(5):293-301, Sept.-Oct. 1972. 6 refs.*

The possibility of using infrared spectrometry for the identification and quantitative determination of polycyclic aromatic hydrocarbons following gas chromatographic purification and separation was studied. Chromatographic spots were eluted with pentane. After pentane was eluted from the solution, the residue titrated with potassium bromide. The resulting tablet was investigated in infrared spectrometer in a wavelength range of 1500-400/cm. This microtechnique, though not as sensitive as those commonly used, such as spectrofluorimetry, ultraviolet spectrometry, or gas chromatography, is more specific than the above methods in that it makes qualitative and quantitative determination of several polycyclic hydrocarbons combinations possible. This method is suitable for analysis in concentrations above 1 to 6 micron, depending on the specific compound. The absorption wavelengths for anthracene, benzo-a-anthracene, benzo-a-pyrene, benzo-e-pyrene, benzo-g,h,i-pyrene, chrysene, coronene, dibenzo-a,h-anthracene, dibenzo-a,e-pyrene, dibenzo-a,i-pyrene, indeno 1,2,3-c,d-pyrene, perylene, and pyrene are 885, 885, 875, 810, 810, 815, 850, 890, 755, 755, 730, 810, and 840/cm, respectively.

27645

APTIC NO. 49883

Bourbon, P., J. Alary, J. Esclassan, and F. Alengrin

MANUAL TECHNIQUE FOR THE DETERMINATION OF NO AND NO2 AT THE EMISSION SOURCE.

(*Technique manuelle de determination de NO et NO2 a l'emission*). Text in French. *Inform. Chim., no. 105:61-73, Feb. 1972. 9 refs.*

Factors influencing the absorbing capacity of the reagent, the oxidation of nitric oxide into nitrogen dioxide, and the conversion of gaseous NO2 into NO ion, occurring in the determination of NO and NO2 by means of the Griess-Saltzman method using sulfanilic acid, acetic acid, and N-naphthylethylene diamine dichlorohydrate as reagents were studied. It was possible to increase the NO2-absorbing capacity by increasing the naphthylethylene diamine concentration. The NO2-to-NO conversion was below 5% during the reaction of NO2 with the Saltzman reagent, increased with increasing diamine concentrations, and with reduced NO2 concentrations. The rate of NO retention for 20-15 ppm concentrations ranged from 10 to 60%. The rate of NO-to-NO2 oxidation by means of potassium permanganate was 80% at about 10% retention with a dry filter, and 90-95% at about 20% retention when a humid filter was used. The rate of oxidation by means of chromic anhydride ranged from 90 to 100% in a NO concentration range of 22-300 ppm and at a flow rate of 7-30 l/h. The presence of humidity was necessary for the efficient oxidation of NO. The coefficient of the gaseous NO2-to NO ion conversion was 0.73 for an NO2 concentration range of 6-120 ppm, and the unit for concentrations below 5 ppm. Sampling for nitrogen oxides determination at emission sources where the concentrations may range from zero to 300 ppm should be done at a rate of 20-40 l/hr, using 85%-phosphoric acid for dehydration of the gas sample.

27646

APTIC NO. 49233

Bricard, Jean, Guy Madeleine, Philippe Reiss, and Pierre-Yves Turpin

CONTINUOUS FLOW CONDENSATION NUCLEI COUNTING DEVICE. (*Compteur de noyaux de condensation a flux continu*). Text in French. *C. R. Acad. Sci. Paris, Ser. B, 275(22):837-840, Nov. 1972. 5 refs.*

A continuous-flow condensation nuclei counter is described. The counter is composed of a saturator coated with liquid-impregnated spongy fabric, a 2.1 mm-diameter nozzle cooled by Peltier effect, a constant-rate aspirator, diaphragm, microscope, and photoelectric multiplier. Supersaturation is reached by

adiabatic expansion of a gas which contains vapor-saturated aerosol. The counter, while used primarily for counting Aitken particles, is also suitable for counting particles with diameters up to several micron.

27647

APTIC NO. 49263

Chuan, Raymond L.

MEASUREMENTS OF PARTICULATE POLLUTANTS IN THE ATMOSPHERE. *AIAA (Am. Inst. Aeron. Astronaut.) J.*, 10(12):1701-1704, Dec. 1972. 2 refs. (Presented at the American Institute of Aeronautics and Astronautics, Joint Conference on Sensing of Environmental Pollutants, Palo Alto, Calif., Nov. 8-10, 1971, Paper 71-1099.)

A measurement device was developed to determine directly and in real time the mass of particulate matter suspended in the atmosphere. The device is essentially an active impactor in the form of a small disc of piezoelectric crystal which forms part of a resonant circuit whose frequency is controlled by the mechanical resonant frequency of the crystal. Operating variables and calibration are reviewed. The instrument was tested in aerial measurements of atmospheric particulates, on baghouse and wet scrubber exhaust, and for in-stack measurements at a coal-fired electric power plant.

27648

APTIC NO. 49901

Dee, L. A., H. H. Martens, C. I. Merrill, J. T. Nakamura, and J. Martone

AN IMPROVED MANUAL METHOD FOR NOX EMISSION MEASUREMENT. *United States Air Force, Edwards, Calif., Air Force Rocket Propulsion Lab., Edwards AFB, Calif., Environmental Protection Agency Office of Research and Monitoring Proj. EPAOOCX, EPA-R2-72-067, 108p., Oct. 1972. 23 refs.*

NTIS: PB 212859

Accurate determination of nitrogen oxide emission from stationary combustion sources is necessary to set realistic NOx limits. The current manual NOx sampling and analysis methods, including phenoldisulfonic acid colorimetry were evaluated and were considered to be inherently nonrepresentative and inaccurate. Improved time-integrated sampling and rapid analysis methods were developed. In the new method, the sample gas is drawn through a heated bed of uniquely active, crystalline lead dioxide where NOx is quantitatively absorbed. Nitrate ion is later extracted with water and the concentration subsequently determined by a NO3 Selective Ion Electrode. Calibration curves were determined. A simple selective precipitation eliminated electrode interferences derived from PbO2 absorption of other combustion products such as hydrogen chloride, sulfur oxides, hydrogen fluoride, and carbon monoxide. Field tests were conducted at various stationary source sites, and the data gathered are presented.

27649

APTIC NO. 49589

Dubois, L., A. Zdrojewski, and J. L. Monkman

AN IMPROVED METHOD FOR DETERMINATION OF BENZO(A)PYRENE IN AIR SAMPLES. (*Eine verbesserte Methode zur Bestimmung von Benzo(a)pyren in Luftproben*). Text in German. *Staub, Reinhaltung Luft*, 32(12):487-490, Dec. 1972. 10 refs.

In all air samples benzo(a)pyrene (BaP) is accompanied by benzo(k)fluoranthene (BkF). The latter interferes with BaP measurements by column chromatography and by ultraviolet absorption. Since both BkF and BaP are strongly fluorescent, this property was used as basis for a new analytical method. With fluorescence spectroscopy traces of BaP from 0.0 to 0.1 ppm can be measured in air samples. This has made the use of daily samples instead of monthly ones feasible. After a fast separation of the air sample extract on an aluminum oxide column with toluene as the solution for the elution process, those fractions are collected which contain BaP. The fluorescence emission intensity was measured at the

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wavelengths of 307 and 384 nm. When the mixture of BaP and BkF is excited at a wavelength of 307 nm the intensity of the fluorescence emission of BkF is much higher than that of BaP so that the maximum of the signal is caused by BkF. With the BkF concentration known, its effect in a mixture excited at 384 nm can be calculated, and the concentration of BaP can be determined. The accuracy of the method is better than 0.001 micrograms/ml for BkF and better than 0.002 micrograms/ml for BaP. For preparation of the air samples four circles each with a diameter of 35.5 mm are cut from a glass fiber filter and placed on a piece of glass wool in the Soxhlet-apparatus. The four circles correspond approximately to the 1/10 fraction of the filter area. After 6 hours of extraction with cyclohexane, the solvent is reduced to 2 ml by heating. The glass column for chromatography is covered to a height of 12 cm with aluminum oxide which has been activated in an oven with toluene.

27650

APTIC NO. 49422

Freie, H. G.

A SNIFFING BEAM. (*Een snuffelstraal*). Text in Dutch. *Polytech. Tijdschr., Ed. Elektrotech. Elektron.*, 27(25):834-836, 1972. 6 refs.

The use of laser beams for detecting air pollutants over wide ranges of concentrations and distances is outlined. The system is based on the partial scattering of the photon energy sent to a volume of pollutants to be detected. The resonance radiation of the excited atoms is detected and processed. The laser technique has the advantages of high sensitivity, good spectral separation, and discrimination in time and space. The minimum number of photons detectable is on the order of magnitude of 100. A laser system designed for measuring pollutant concentrations in the atmosphere has a photon output of 10,000,000,000,000,000, a sender energy of 5 m Joules, a wavelength of 405.7 nanom, an integration time of 20 nanosec, a pulse frequency of 100 cm/sec, and a detector efficiency of 0.2. The beam aim area is 0.2 sq m.

27651

APTIC NO. 49391

Gilbert, Traugott

THE MONITORING OF INDUSTRIAL EMISSIONS. (*Die Ueberwachung industrieller Emissionen*). Text in German. *Tech. Ueberwach. (Duesseldorf)*, 13(7/8):247-250, 1972.

Continuous monitoring is used for the measurement of particulates and sulfur dioxide. Boiler furnaces operated with solid or liquid fuels and with a heat production of more than 100 Gcal/hr are monitored continuously, as are cement plants. In the near future, iron and steel plants also will have to be continuously monitored. A brief description of sampling methods such as photometry, colorimetry, gas chromatography, and mass spectrometry is given. Measurements of gaseous and particulate emissions were taken in various plants. The hydrocarbon concentration from a naphthalene factory was to 1.0 to 5.0 g/cu m, and in anthracene melting plants 2.0 to 15.1 g/cu m. In the waste gas of brick kilns the gaseous fluorine compounds reached concentrations of 180 mg/cu m. The West German Federal Ministry of the Interior authorized two units for the continuous measurement of SO2 in waste gases of boiler furnaces (100 Gcal/hr), the Uras I and II. For the continuous measurement of dust emissions, the smoke density measuring units RM 3 and D-R/110 have been authorized.

27652

APTIC NO. 49451

Hall, H. J. and R. H. Salvesen

EVALUATION OF MEASUREMENT METHODS AND INSTRUMENTATION FOR ODOROUS COMPOUNDS IN STATIONARY SOURCES. VOLUME 1 -- STATE OF THE ART. *Esso Research and Engineering Co., Linden, N. J., Government Research Lab., Environmental Protection Agency Contract 68-02-0219, Pub. APTD-1180, 96p., July 1972. 147 refs.*

NTIS: PB 212812

MEASUREMENT METHODS

27657

Measurement methods and instrumentation for odorous compounds emitted from processes within kraft pulping, petroleum/ petrochemical, and animal rendering plants are reviewed and evaluated. The odorants emitted from these plants consist primarily of hydrogen sulfide, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, alkyl and aromatic mercaptans, carbonyl sulfide, aliphatic aldehydes, ammonia, and amines. The specific emission sources, related odorants, and the design and operation of various measurement methods for specific compounds or general odor determination including coulometric titration, odor panels, flame photometric detectors, spectroscopy, gas chromatography, tape samplers, conductimetry, ultraviolet spectrophotometry, colorimetry, electrochemical techniques, bioluminescence and chemiluminescence detectors, infrared spectrometry, photofluometry, infrared lasers, silver filter membranes, and plasmatology are examined.

27653

APTIC NO. 49854

Harada, Seiichi

APPROACH TO POLLUTION MEASUREMENTS FROM INDUSTRIAL MEASUREMENT. (*Kogyo keisoku kara mita kogai keisoku e no apurochi*). Text in Japanese. *Keiso Instrum.*, 15(2):6-9, Feb. 1972.

The measurement of pollutants subject to legal inspection is almost all manually done according to the Japanese Industrial Standards. This is because most pollutant instruments are analyzers which require more technical and complicated handling of the pollutants than industrial pollutants measurement equipment. At present, automatic continuous measuring equipment is used largely for sulfur dioxide, carbon monoxide, and pH. Some apparatuses are used for oxidant, nitrogen oxides, hydrocarbons, basic oxygen demand, dissolved oxygen, and cyanogen. And for these limited number of pollutant measurement apparatus, there are still many problems. Most of them require adjustment of sampling conditions such as temperature and pressure, and the elimination of obstructions such as water, dust, and soot. Equipment is generally overly expensive and technically unsatisfactory, compared to a common household apparatus such as a color television. Sensitivity and accuracy leave much to be desired. There is no odorometer yet. But the human nose is sensitive enough to detect 1/100 or 1/1000 ppb, depending on the elements. Therefore, much difficulty is expected in developing a satisfactory mechanical device for measuring odor. At the moment, the technical development of pollution meters is left to manufacturers. From the standpoint of cost and technical excellence, this should not be so. In the future, government participation in development and distribution is desirable.

27654

APTIC NO. 49104

Hayashi, Junichi, Kazumi Koike, Ichiro Kojima, and Yasuyuki Hoshika

AN INSTALLATION EXAMPLE OF ODOR FREE ROOM FOR ODOR POLLUTION RESEARCH. (*Akushu kogai chosa no tame no mushu-shitsu no secchi rei*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 170. 2 refs. (Nov. 7-9, Paper 125.)

The conditions to be taken into consideration in designing an odor free chamber for sensitivity tests of bad odor are discussed. For the chamber, a light, a ventilation fan, steam scrubber nozzles, packing, air filters, air supply filters, activated carbon filters for exhausts, and drainage are necessary. The air supply and exhaust should be operated throughout the year so that the room would be conditioned during summer at 26 + or 1 C, during winter at 22 + or 1 C, and relative humidity 50 + or 10%, in order to eliminate any stagnant odor. During the experiments, there should be no movement of the air in the chamber, and the odor concentration should be even and uniform throughout the room. Leakage or diffusion through the windows and keyholes should be avoided; the odor should not diffuse in the several minutes which are required for preparation of the sensitivity test and evaluation.

27655

APTIC NO. 49826

Heflinger, L. O., B. J. Matthews, and H. Shelton

PORTABLE LASER VELOCIMETER FOR STACK VELOCITY MEASUREMENTS. (FINAL REPORT).

TRW Systems Group, Redondo Beach, Calif., Environmental Protection Agency Contract 68-02-0308, TRW Rept. 20852-6002-RO-00, EPA-R2-72-132, 69p., Nov. 1972. 3 refs.

NTIS: PB 213263

The design and construction of a portable laser velocimeter for stack velocity measurements at close range, and the analysis of optical velocity measurement techniques over ranges up to 1500 ft are discussed. The laser velocimeter operates on an interference backscatter principle. It is portable and designed to measure velocities of flowing particle laden gases in power plant ducts or stacks. The instrument is composed of a sensing head cabinet and an electronics cabinet. The sensing head incorporates a laser illuminator, beam forming optics, and photodetector. The electronics cabinet contains a signal processing circuit, spectrum analyzer, and power supplies for the laser and spectrum analyzer. The spectrum analyzer is used to analyze the frequency signals generated by the sensing head. Design and operating characteristics for the laser velocimeter are listed, and its construction and preliminary testing is discussed. Optical velocity measuring devices for extended range operations were also analyzed. Three types of optical velocimeters were considered: the Doppler shift, interference-fringe, and a reticle velocimeter. The characteristics of each were discussed.

27656

APTIC NO. 49587

Herbolsheimer, Rolf

GAS CHROMATOGRAPHIC DETERMINATION OF ORGANIC COMPOUNDS IN ATMOSPHERIC AIR WITH SPECIAL REGARD OF AUTOMOBILE EXHAUSTS.

(*Gaschromatographische Bestimmung von organischen Verbindungen in der atmosphärischen Luft unter besonderer Berücksichtigung der Autoabgase*). Text in German. *Stadtehygiene (Uelzen/Hamburg)*, 23(12):280-286, 1972. 2 refs.

A gas chromatographic technique for measuring hydrocarbons, esters, and chlorinated hydrocarbons in the air was tested on a busy street. The pollutant emission by automobiles was measured with an adsorption tube consisting of a layer of 10 to 12 cm molecular sieve 5A followed by 3 cm of activated coal. At a sampling rate of 300 ml/min, the sampling time was 30 min. Since the sampler consisted only of the pump, a piece of hose, and the 15 cm long adsorption tube it could easily be attached to the hem of a skirt of a person taking the samples. At moderate traffic, 4.04 mg/cu m total hydrocarbons without methane were measured on the pedestrian walk, 0.75 mg acetylene/cu m, 0.51 ethylene, 0.21 benzene, 0.34 toluene, 0.33 m-xylol plus p-xylol plus ethylbenzene, 0.08 mg/cu m o-xylol, and 0.03 mg other aromatics.

27657

APTIC NO. 49065

Hinds, W. and P. C. Reist

AEROSOL MEASUREMENT BY LASER DOPPLER SPECTROSCOPY - II. OPERATIONAL LIMITS, EFFECTS OF POLYDISPERSITY, AND APPLICATIONS. *Aerosol Sci.*, 3(6):515-527, Nov. 1972. 5 refs.

The operational limits of size and concentration for aerosol sizing by laser Doppler spectroscopy (LDS) were defined by theoretical calculations and computer simulation. A state-of-the-art LDS system has the capability of sizing 0.03-micron diameter particles when the number concentration is 10 to the 6th power/cu cm or greater and 0.2-micron diameter particles for concentrations as low as 100 particles/cu cm. The effect of a polydisperse aerosol with a log normal distribution on LDS measurements was also examined. For aerosols having log normal distributions with (0.3 less than count median diameter less than 3 micron) and (1.0 less than geometric standard deviation less than 2.0), LDS is able to measure the surface

area median diameter within $\pm$ or 15%, independent of polydispersity. The applications of the LDS system to aerosol sizing and its advantages and disadvantages relative to other sizing methods are reviewed. (Author abstract modified)

27658

APTIC NO. 49082

Hinds, W. and P. C. Reist

AEROSOL MEASUREMENT BY LASER DOPPLER SPECTROSCOPY - I. THEORY AND EXPERIMENTAL RESULTS FOR AEROSOLS HOMOGENEOUS. *Aerosol Sci.*, 3(6):501-514, Nov. 1972. 18 refs.

The basic theory, experimental techniques, and results are presented for a technique for sizing aerosol particles in situ using laser Doppler spectroscopy. Unlike conventional light scattering procedures which use average intensity information, this technique utilizes the Doppler shifted frequency of the scattered light produced by the Brownian motion of the aerosol particles to determine particle diffusion coefficients and size. Experiments were carried out using monodisperse dibutylphthalate (DBP) aerosols and monodisperse polystyrene latex (PSL) spheres in concentrations ranging from 1000 to 1,000,000 particles/cu cm. Measured particle sizes were within 10% of the size predicted by conventional light scattering methods for DBP particles and the reported sizes of PSL particles. Results indicate that laser Doppler spectroscopy can be used to accurately measure aerosol particle size in situ. (Author abstract modified)

27659

APTIC NO. 49799

Hochheiser, Seymour

CONCEPTS IN THE DETERMINATION OF EQUIVALENCE BETWEEN METHODS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Div. of Atmospheric Surveillance*, 12p., 1972. (Presented at the Conference on Methods in Air Pollution and Industrial Hygiene Studies, 13th, Berkeley, Calif., Oct. 30-31, 1972.)

An annotated outline of the concepts in the determination of equivalence between sampling methods is presented. Means for demonstrating equivalence are needed by all concerned with implementing national regulations on ambient air quality, including the Environmental Protection Agency, State, and local air pollution control agencies, and instrument manufacturers. To assure the compatibility of measurements, the concepts of performance specification and the consistent relationship using ambient air were applied. Performance specifications are defined in terms of major parameters affecting quality of results. Test specifications are given for carbon monoxide, oxidant, hydrocarbons, and sulfur dioxide.

27660

APTIC NO. 49145

Inokoshi, Yukio, Masamichi Ikeda, Tatsuo Yamamoto, and Yoshiharu Shinozaki

MEASUREMENT OF NITRIC OXIDE IN THE ATMOSPHERE BY THE CHEMILUMINESCENT REACTION BETWEEN NITRIC OXIDE AND OZONE. (*Is-sanka chisso to ozon ni yoru kemiruminessensu o mochiita taiki-chu no sanku chisso no sokutei*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 259. (Nov. 7-9, Paper 213.)

The chemiluminescent method of measuring nitrogen oxides, using the reaction between nitric oxide and ozone, was examined. The apparatus consisted of a needle bulb, a flowmeter, a dilution flask, a reaction chamber, and a mercury bubbler. The mixture of nitric oxide and nitrogen dioxide, and ozone and oxygen was led through the needle bulb and the flowmeter into the reaction chamber. The atmospheric pressure was maintained throughout the experiment. The container was covered by aluminum foil to improve the reflection. The time and luminescence intensity using various concentrations of NO are indicated in a diagram. The relationship is linear,

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but the linearity is lost near the dark current. A good linear relationship between NO concentration and the luminescence intensity was obtained from 300 to 0.1 ppm NO. The limit was approximately 0.1 ppm, therefore it would be necessary to improve the sensitivity in order to measure NOx in the air.

27661

APTIC NO. 49194

Ishiguro, Tatsukichi, Isao Koyama, Yoshiteru Iwasaki, Yu Fukushima, Yoshiko Kobayashi, and Toshio Odaira

INVESTIGATIONS OF ODOR DAMAGES -- EVALUATION OF ODORS, II. (*Akushu no higai chosa -- akushu no hyoka II*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 171. (Nov. 7-9, Paper 126.)

For methods of evaluation of odor nuisance damages, the direct interview of the victims, the investigation of the polluted area, and the investigation of frequency of odor nuisance can be conducted. The investigation of the area comprises the examinations of seasonal trends, weather conditions, wind direction and velocity, and the area covered by the pollutant. The purpose of the frequency test is to see the continuity of odor and the correlation between duration and the degree of unpleasantness. This latter could be obtained by comparing the reactions of a panel made up of inhabitants from the area and a panel of people from outside the area. If the odor is evenly dispersed, the victims sense becomes fatigued and acclimated; but if there are fluctuations in the degrees of concentration of odor, the waves of stimuli of the olfactory nerve will create unpleasantness. In order to record the frequency (sporadic stimuli) of bad odor simultaneously, a bad odor checker for a monitor was devised.

27662

APTIC NO. 49398

Ishiguro, Tatsukichi, Isao Koyama, Atsuko Kobayashi, Toshio Ohira, and Yu Fukushima

STUDY ON AN EVALUATION METHOD FOR OFFENSIVE ODORS. (1ST REPORT). (*Akushukogai no yokahoho no kenkyu (Daiippo)*). Text in Japanese. *Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.)*, vol. 3:73-76, March 1972. 5 refs.

Offensive odors from fish and animal bone processing plants were tested by olfactory panels. Odors were smelled from: 300-500 m away from one plant. Within 300 m, the odor was detectable. At another plant, the odor was detectable at 2 km, and was intolerable within 500 m. Ammonia, trimethyl amine, hydrogen sulfide, methyl mercaptan, and isovaleric acid mixtures were prepared at concentrations of 10-1000 times the threshold value and smelled by the panel members. Ammonia and methyl mercaptan and ammonia and H₂S mixtures gave stronger ammonia odors than plain ammonia. The odor was more detectable with a trimethyl amine and methyl mercaptan mixture than trimethyl amine and H₂S. Odors increased with higher concentrations; odors of the components were simply mixed rather than synthesized. Odors increased with a mixture of isovaleric acid and methyl mercaptan and with isovaleric acid and trimethyl amine.

27663

APTIC NO. 49256

Ito, Takashi, Hiroshi Saito, and Nobuo Furuya

CONTINUOUS DUST CONTENT MEASUREMENT KONITEST. (*Konitesuto ni yoru ganjinryo no renzoku sokutei ni tsuite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 247. (Nov. 7-9, Paper 201.)

The principle, structure, and performance of the Konitest (a continuous, automatic dust meter) are presented. A dust containing gas is rotated at a high speed in a tube made of a special material; electric charge occurs when the gas comes in contact with the mechanism, indicating the amount of dusts in the gas. The electric charge is amplified and goes to the signal

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handling system which records the output automatically. With any dusts, the output results show linearity. This apparatus was installed at the exit of an electrostatic precipitator of a cement kiln exhaust flue; the result was linear. The electric output and dust quantity showed, within the 0-10,000 mg/N cu m range, a good linear relationship. The gradient is different depending on the type of dusts, but in the case of cement dust, the type, particle size, and electric resistance had little effect on the output characteristics. Humidity of gas and temperature also presented no problem. The results of konitest, and the measurement obtained by the JIS method agreed well.

27664

APIC NO. 49195

Iwasaki, Yoshiteru, Tatsukichi Ishiguro, Isao Koyama, Yu Fukushima, Yoshiko Kobayashi, and Toshio Odaira

METHODS FOR MEASURING AND EVALUATING ODOROUS AIR POLLUTANTS -- EVALUATION OF ODORS, III. (*Akushu no sokutei to hyoka no hoho -- akushu no hyoka, III*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 165. (Nov. 7-9, Paper 120.)

The basic method of odor measurements is indication of unpleasantness and odor concentration. Odor conditions are determined by the emission sources, meteorological dispersion, topographical conditions, and the victims, and each of these items have several deciding factors. For indicating odor measurements, the tri-point comparative odor bag method is superior. Any chemical analysis (including gas chromatography) or mechanical measurements are totally undependable at the present time. Dispersion of bad odor is extremely complicated, and the use of a theoretical dispersion equation is almost impossible. Field tests are necessary for almost all cases. Human sensitivity tests have been considered unreliable and variable and therefore could not be used for standardization. However, after many experiments, it was concluded that an objective evaluation of an odor by the sensitivity test is quite possible, and this is the tri-point comparative odor bag method.

27665

APIC NO. 49081

Kimura, Kikuzi

DETERMINATIONS OF AIRBORNE FIBROUS DUST CONCENTRATION. (*Chodai ni funjin o chushin to shita hatsujin*). Text in Japanese. Rodo Kagaku (J. Sci. Labour, Tokyo), 48(11):681-688, 1972, 23 refs.

The determination of airborne fibrous dust concentrations by the Roken-type dust counter, a modified Owens-type using inertial collection, was studied. The counter was modified to use a cover-glass coated with silicon oil so that particles as long as 10 micron could be collected. A Millipore membrane filter was also used for dust collection. The membrane was mounted on a glass slide by the following procedure in a dust-free room -- several drops of solution were put on a glass slide and the membrane filter was placed on the solution with its dust-deposited side upwards. After a clean cover glass was placed on top, it was left for about 30 min, until the membrane became transparent. Dust particles collected by both methods were counted with an interference phase contrast microscope. Airborne dust concentrations were measured by the membrane filter method in several working areas, including asbestos processing, glass fiber processing, metal polishing, hemp cloth sewing, and printing plants, and some offices. Results are given.

27666

APIC NO. 49742

Kimura, Kikuzi

ON THE SPECTRA ANALYTICAL FILTER PAPER DUST SAMPLER. (*Bunko roshi pinai kei ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 246. (Nov. 7-9, Paper 200.)

The main improvements made by the spectra analytical filter paper dust sampler over the previous membrane filter are its ability for simultaneous sampling and measuring; the use of single wavelength for permeation measurement; and the use of large glass fiber filter around which 12 samples can be collected. After one minute of suction of the air, the optical density is measured. Usually the measurement by a 370-millicron wave is used. In the preparatory operation, the relationship between the permeation rate of this wavelength and the dust concentration is determined, and the dust density can be obtained from the permeation rate deterioration. After experimenting with various types of dusts, it became clear that the same kind of dusts having a different particle size distribution had a different index between permeation rate and density rate. For this, an adjustment was made by obtaining the settling index of dusts. Also, when the color of the dusts are different, the results are also different. In this case, the reflection rate of the dusts is obtained and the relationship between this rate and the relative sensitivity was obtained. The greater the reflection rate or the smaller the settling index, the relative sensitivity of the meter grows lower; therefore, when dust density is calculated from the permeation rate, the settling index and the color of the dusts must be examined first and the relative sensitivity must be examined. When more than two kinds of dusts are mixed, the mixture ratio can be obtained by the use of the ratio between the permeabilities of different wavelengths.

27667

APIC NO. 49100

Knauer, A.

A MICRO-METHOD FOR DETERMINATION OF FORMALDEHYDE IN ATMOSPHERIC AIR. (*Eine Mikro-Methode zur Bestimmung von Formaldehyd in atmosphärischer Luft*). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12):921-925, 1972, 15 refs.

High demands are placed on the analytical method for formaldehyde measurements in atmospheric air, particularly for mobile stations. The minimum detection limit is 4 micrograms/cu m at a sampling time of 15 min. The samples should remain stable for at least 24 hr. None of the familiar methods meets these demands. Therefore a new method was developed which is based on the familiar reaction between formaldehyde, sulfite, and pararosaniline producing a red color. Through the use of an optimum reaction solution, a molar extinction of 26,000 was achieved. For absorption, a sulfite solution stabilized with TCM solution was used. With this method a detection limit of 2 micrograms/cu m was achieved at a sampling time of 15 min. The sample stability lasts 2 days. With measurements in the range of the short-term maximum allowable emission concentration, the relative standard deviation was + or 6%.

27668

APIC NO. 49243

Koshi, Shigeharu, Toshikazu Okita, Kazunari Imagami, Akihide Tajiri, Yoshio Urushiyama, Ikuei Kifune, and Ryuchi Sugai

COMPARATIVE MEASUREMENTS OF ATMOSPHERIC PARTICULATE MATTER. (*Taichu fuyu ryushijo busshitsu sokutei-ho no hikaku kento*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Soc. Air Pollut., 13th, 1972, p. 239. (Nov. 7-9, Paper 193.)

Various samplers for suspended particulates were compared by measurements of the air quality in a polluted area (Tokyo) and a relatively non-polluted area (Niigata). Equipment compared were the low-vol sampler with a settling particle separator, the light scattering particle concentration meter, the tape air sampler, and the impactor dust meter. Measurements were taken between Oct. 1, 1971 and Jan. 31, 1972 in Tokyo, and from Oct. 1 through Dec. 28 in Niigata. Two low-vol samplers each were used in both cities. Sampling time was 11 am to 10 pm every day, and in the interval, filter papers were changed and the equipment was checked. Correlations between mea-

surements and averages were obtained. The relative errors of low-vol samplers were 10% in Tokyo and 13% in Niigata; for light scattering particle meter, 26% in Tokyo and 15% in Niigata; for tape air samplers, 19% in Tokyo and 35% in Niigata, and for impactor dust meters, 40% in Tokyo and 26% in Niigata.

27669

APTIC NO. 49325

Kurtschatowa, G.

COMPARISON OF TWO METHODS FOR THE DETERMINATION OF ALUMINUM IN DUST. (*Vergleichende Charakteristik zweier Methoden zur Bestimmung von Aluminium im Staub*). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete (Berlin)*, 18(12):929-930, 1972.

Two methods are available for the determination of aluminum in atmospheric dust -- the method with chromium azurol S and the one with eriochromiumcyanine R. With the chromium-azurol-S-method the aluminum ion is mixed with the reagent at a pH of 5.8. Then ascorbic acid, sodium acetate, and lye are added. A colorful compound is obtained whose extinction is proportional to the aluminum concentration. The extinction is measured at 540 nm. With the eriochromiumcyanine method the Al-ion forms a purple complex compound at a pH of 5.4 whose extinction is measured at 540 nm. The complex compound is obtained by adding hydroxylamine chloride, eriochromiumcyanine R-solution, lye, acetic acid, and 5 ml of a buffer solution. Both methods can be applied for the concentration range 1 to 10 micrograms at a sensitivity of 1 microgram in 25 ml. As far as interferences are concerned, the chromium azurol-S-method is superior to the eriochromiumcyanine-R-method. Iron(III), fluorine, organic compounds, and phosphate interfere with the eriochromiumcyanine R-method. The latter method is better as far as reproducible results are concerned.

27670

APTIC NO. 49508

Leroux, J., A. B. C. Davey, and A. Paillard

SAMPLING AND ANALYTICAL CONDITIONS FOR DETERMINATION OF THE HEALTH RISK CAUSED BY SILICIC ACID-CONTAINING DUSTS.

(*Probenahme- und Analysenbedingungen zur Feststellung des von kieselstaurehaltigen Staeben verursachten Gesundheitsrisikos*). Text in German. *Staub, Reinhaltung Luft*, 32(12):491-494, Dec. 1972. 6 refs.

An improved technique of quartz analysis by X-ray diffraction using silver filters is proposed following an evaluation of the sampler characteristics and the analytical conditions which should be selected in order to give full significance to the generally accepted threshold limit value formula related to respirable size dusts. In air samples from industrial cities of the Northern Hemisphere, 10.4% quartz was measured on the average. The samples were taken over a period of 17 years in 12 cities including Ottawa, Montreal, Detroit, New York, Paris, Madrid, Rome, and Tokyo.

27671

APTIC NO. 49758

Liberti, Arnaldo

PROBLEMS AND PROSPECTIVES IN THE MEASUREMENT OF ATMOSPHERIC POLLUTION. (*Problemi e prospettive sulla misura dell'inquinamento atmosferico*).

Text in Italian. *Chim. Ind. (Milan)*, 54(9):793-800, Sept. 1972. 13 refs. (Presented at the *Giornate della Chimica, 23rd Convegno, Milan, Italy, April 14-20, 1972.*)

Sulfur dioxide can be determined by alkalimetry, colorimetry, conductometry, potentiometry, coulombmetry, or flame photometry; the choice of method depends on the purpose of the measurements. The periodicity of pollution phenomena and the influence of environmental factors demand data which can be statistically analyzed to make it possible to forecast pollution phenomena. Of special interest in pollution measurement are analyzers which use electrodes as detectors of specific

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ions. Such instruments are first generation sensors which measure the pollutant directly. Second generation sensors operate on another principle: thus nitrogen oxides measurement which is difficult to accomplish satisfactorily by traditional methods can be accomplished by using ozone which reacts with NOx in the gaseous phase causing chemiluminescence whose intensity is proportional to the NOx concentration. Another type of a second generation instrument is a detector of SO2 or of sulfonated compounds which works on the principle of flame photometry. Generally, however, these instruments are too complicated and costly to be used on a large scale and therefore third generation measuring instruments can be foreseen based on direct action of the pollutant on a chemoelectric transducer modifying it without the necessity of a liquid or a gaseous phase. Spectrometry and laser-radar methods are also mentioned.

27672

APTIC NO. 49379

Luckat, Siegbert

A METHOD FOR DETERMINATION OF THE EMISSION RATE OF GASEOUS POLLUTANTS. (*Ein Verfahren zur Bestimmung der Immissionsrate gasfoermiger Komponenten*). Text in German. *Staub, Reinhaltung Luft*, 32(12):484-486, Dec. 1972. 6 refs.

A procedure is described to determine the absorption rate of gaseous air pollutants based on the reaction of a pollutant with a liquid surface. The absorption liquid is transported by a circulation system to a cylindrical carrier which is uniformly soaked and wetted. By a special device, a coherent liquid film is developed which is adequate to the geometric surface of the carrier, and thus represents a standardized measuring area. Depending on the chosen absorption solution, different pollutants can be determined, selectively or with each other.

27673

APTIC NO. 49234

Mamuro, Tetsuo

ANALYSES OF POLLUTANTS USING RADIATION.

(*Hoshano riyo ni yoru kogai bussuitsu no genso bunseki*). Text in Japanese. In: *Hoshasen o riyo suru genso bunseki ni yoru kankyo osen no kenkyu*. (Studies on Environmental Pollutants Analyses with the Use of Radiation). Osaka Prefectural Radiation Research Center (Japan), p. 43-51, Oct. 1972. 14 refs.

Neutron activation analyses of metal pollutants in air and waste water are described. Samples in air were collected at four locations in the Osaka area for 1 month at a 10-20 l/min air flow rate using a millipore RA membrane filter, 4.7 cm in diameter. Particulates collected from about 100 cm of air and a standard sample were irradiated with a hot neutron flux of 2 times 10 to the 13th n/sq m/sec and a high-speed neutron flux of 3 times 10 to the 12th n/sq m/sec at two irradiation times, 5 min and 1 hr. The sample was irradiated for 5 min and was then cooled for 2 min and 15 min, and analyzed with a wave height analyzer. The samples irradiated for 1 hour was cooled for 2-3 days, 6-7 days, and 15 days, and the gamma-ray spectra were measured.

27674

APTIC NO. 49516

Matsushita, Shukaku

SEVERAL ANALYTICAL METHODS FOR THE DETERMINATION OF CARCINOGENIC HYDROCARBONS IN AIR POLLUTANTS. (*Taiki osen bussuitsu-chu no hatsugansei tankaisuo no shobunsekiho*). Text in Japanese.

Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 115. (Nov. 7-9, Paper 70.)

Newly developed carcinogenic hydrocarbon analysis methods are discussed. The precision analysis method comprises air sampling by hi-vol sampler, vacuum sublimation extraction of polynuclear aromatic hydrocarbons, the extraction of elements by double-layer, two-step, thin-layer chromatography, and fluorescent spectrometry. The vacuum sublimation condition is

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0.01-0.005 mm Hg, 300 C, and 30 min. By this method, 70 to 80 kinds of polynuclear aromatic hydrocarbons can be extracted and 31 identified, 13 of which are clearly carcinogenic or suspected of being such. This method is effective for analyzing inhibitors and promoters for known carcinogens and their mechanisms, and also for identification of unknown elements and their effects on carcinogenesis. The simplified method consists of the same processes, but eliminates one step from the thin-layer chromatography. For fluorescent analysis, the spots on the thin layer plate can be identified and measured directly. This is applicable for analyzing benzo(a)pyrene, benzo(b)fluoranthene, pyrene, and fluoranthene. The quick analysis method consists of air sampling, vacuum sublimation extraction and the fluorescent analysis of benzo(a)pyrene. The selective quantitation of benzo(a)pyrene from 70-80 hydrocarbons is achieved by combining the narrow base line method and extinction of fluorescence. By this method, benzo(a)pyrene can be detected from 10 samplings in one day, and can be increased to 50 samplings if the vacuum sublimation extraction apparatus can be increased.

27675

APTIC NO. 49239

Matsuura, Akiyoshi, Masayoshi Mizukami, Isao Ogawa, and Yoshimatsu Odate

THE EFFECTS OF SULFUR OXIDES ON DUST CONTENT MEASUREMENTS IN STACK GAS. (Endo haigas-u-chu no baijin ryo sokutei kekka ni oyobosu io sanku butsu no eikyo). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 237. (Nov. 7-9, Paper 191.)

In measuring the dust concentration in oil boiler flue gases, the effect of sulfur oxides on the glass fiber can increase the actual measurement of dusts. Two cylindrical holders with various combinations of glass fiber filter paper and quartz glass filter paper were connected, and samplings were taken from the boiler flue. The combinations were: glass and glass, glass and quartz, quartz and quartz, and quartz and glass. When comparing the measurements of the first holders, the measurement in a glass filter proved 16.7% higher than that of a quartz filter. The effect of sulfur oxide on glass fiber filter was between 15 and 17%. Almost no sulfur oxide was detected in the dusts, having been adsorbed on the glass filter. The analysis of a quartz filter showed no sulfur content; therefore, quartz filter receives no effect of sulfur oxides. Thus, a quartz filter is suitable when sampling flue gas.

27676

APTIC NO. 49200

Matz, J., K. Horn, G. Pastucha, A. Piersig, I. Trautmann, and S. Wiedemann

DISCUSSION OF SOME PROBLEMS OF THE DETERMINATION OF NITROSOAMINES IN ATMOSPHERIC AIR. (Zu einigen Problemen der Bestimmung von Nitrosaminen in der atmosphärischen Luft). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12):932-933, 1972. 26 refs.

Literature provides hardly any information on the formation, existence, isolation, and analysis of nitrosamines in the atmospheric air. Beginning in 1954 a large number of publications dealt with the toxicity and carcinogenic effect of various nitrosamines. For a long time nitrosamines could be analyzed only in solid substances (food). In the year 1961 nitrosamines for the first time could be analyzed in cigarette smoke. The formation and presence of nitrosamines in the atmosphere seems to be possible. A method for determination of the nitrosamines in atmospheric air is urgently needed. A work group has been assigned the task of developing such a method. A literature survey revealed that colorimetry seems to provide the most suitable basis for such method.

27677

APTIC NO. 49352

McClatchie, E. A.

DEVELOPMENT OF AN INFRARED FLUORESCENT GAS ANALYZER. Arkon Scientific Labs., Berkeley, Calif., National Air Pollution Control Administration Contract CPA-70-152, ARFR-14, EPA-R2-72-121, 10p., Aug. 1972.

NTIS: PB 213846

A prototype carbon monoxide analyzer using an infrared fluorescent source was built and tested. This type of analyzer has the capability to advance the state of the art in non-dispersive infrared carbon monoxide measurement devices in the areas of stability and freedom from interferences by other gases. The theory behind the analyzer's operation and operating variables are discussed. The effects of ambient temperature and pressure variation on the span and zero stability of the fluorescent CO analyzer must be investigated before its true performance advantages can be assessed. A potential factor of 10 improvement in CO noise level can be attainable by a thorough upgrading of the optical components of the analyzer.

27678

APTIC NO. 49238

Mizuta, Hajime

A CONSIDERATION ON LARGE PARTICLE SEPARATOR (10 MICRON CUT) OF ATMOSPHERIC PARTICULATE MATTER IN AIR SAMPLING. (Eya sanpuringu ni okeru fuyu ryushijo busshitsu no sodai ryushi bunri (10 mikuron katto) ni tsuite no ichi kosatsu). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 243. (Nov. 7-9, Paper 197.)

Problems in separating particles more than 10 micron in diameter from the samplings of suspended particulates were examined. Ideally, the 100% permeation rate should be obtained near 10 micron; but in reality, the curve of permeation starts near 8 micron, cutting off all the particles larger than 8 micron. The closer the curve is to the ideal curve, the better the quality of the separator. The performance precision of a multi-level settling separator, a cyclone-type separator, and a centrifugal separator were examined. The centrifugal separator had a sharp size in the beginning, close to the 10 micron limit; the curve of the cyclone was slow. These separators were attached to air samplers to see the permeation rate using four standard size particles. The permeation rate was small for the cyclone-type. Settling-type separators with a 50% limit diameter and a 100% limit diameter were constructed and the permeation rates were examined. When the 100% limit diameter was 10 micron, the permeation rate was rather small. Further experiments are to be conducted.

27679

APTIC NO. 49300

Motycka, Jiri and Hans J. Leutheusser

CONCENTRATION METER FOR WIND TUNNEL STUDIES OF GASEOUS DISPERSION. Atmos. Environ., 6(12):911-916, Dec. 1972. 6 refs.

The design, operating, calibration procedure, and application of a photoelectric technique for the instant determination of contaminant concentration in wind tunnel studies of stack gas dispersion are examined. A roving sensor is used to measure the light scattered by the particles of oil aerosol representing the prototype stack effluent. The miniature probe has a noise level of only 0.00001 of the full linear range of the output signal for a time constant of 5 sec. The device is also suitable for the measurement of fluctuating flow properties, e.g., turbulence, where a high frequency response is required. (Author abstract modified)

27680

APTIC NO. 49797

Mueller, Peter K., SuzAnne Twiss, and George Sanders

SELECTION OF FILTER MEDIA AN ANNOTATED OUTLINE. Preprint, 12p., 1972. (Presented at the Con-

ference on Methods in Air Pollution and Industrial Hygiene Studies, 13th, Berkeley, Calif., Oct. 30-31, 1972.)

An annotated outline on the composition and selection of filter media for filter samplers is presented. The composition of the filter media severely limits the chemical analysis of air that can be done. The filter medium must have a particle retention efficiency equivalent (deviation not greater than plus or minus 10%) to the glass fiber for measuring particulate matter -- this is the only fixed requirement for filters. Beyond that, requirements for chemical composition can be optimized with minimizing resistance to airflow. Information about the performance of different filter media in actual field sampling situations is presented, including the chemistry of the filter medium -- a comparison of glass fiber with cellulose filters, a comparison of glass fiber pH 11.5 with glass fiber pH 6.5-7.0, glass fiber acid washed Gelman A versus 10 micron Teflon Millipores, and a comparison of cellulose fiber filters; a discussion on pore size, face velocity, and particle size; the effect of various sampling times and relative humidity; and variations in sample gathering.

27681

APTIC NO. 49758

Nader, John S.

DEVELOPMENTS IN SAMPLING AND ANALYSIS INSTRUMENTATION FOR STATIONARY SOURCES.

Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 15p., 1972. 7 refs. (Presented at the Conference on Methods in Air Pollution and Industrial Hygiene Studies, 13th, Berkeley, Calif., Oct. 30-31, 1972.)

Developments in measurement, sampling, and analysis instrumentation for stationary sources are discussed. Instrumentation for the measurement of pollutant emissions from stationary sources is best considered in terms of a complete system consisting of subsystems having interdependent functions, including sample-site selection, sample transport, sample treatment, sample analysis, data reduction and display, and data interpretation. Five measurement approaches exist, two of which involve sample extraction from within the stack. The remaining three are advanced techniques using electro-optical techniques, including in-situ monitoring, remote sensing, and long-path sensing. Current development status of instrumentation for each approach was categorized as systems commercially available, research or prototype developments, and feasibility studies. The incompleteness of a measurement system is caused by the lack or inadequacy of an interface to couple a monitor to a source. This applies to the two approaches that involve sample extraction and that predominate as commercially available products. New systems using advanced electro-optical techniques avoid the need for sample extraction and the complications associated with the interface functions.

27682

APTIC NO. 49177

Nakamura, Keigo and Hironori Haneda

DETERMINATION OF HYDROGEN CHLORIDE IN EXHAUST GAS FROM INCINERATORS FOR CITY WASTES. (Toshi gomi shokiyaku-ro haigas-chu no enka suiso no sokutei). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 112. (Nov. 7-9, Paper 67.)

The thiocyanic acid secondary mercury method of measuring hydrogen chloride in the refuse combustion gas was examined. The accuracy of determination, sampling conditions, and sampling errors in this method were examined by measuring various incinerator combustion gases. The accuracy was tested by chlorine ion standard solution (10 microliters), and the absorption was measured with seven samplings taken over a period of 10 days. The repeatability was 0.0003, the fluctuation index was 0.73. Sanitation plant exhaust gases were sampled five times on different days. Within the concentration range of 68-855 ppm, the fluctuation index was 0.39-2.76. When the gas

contains much water, condensation occurs in the sampling tube and HCl dissolves in the water, lowering the measurement. In this experiment, fork tubes were attached to the sampling tube and the fork tubes were connected to two different absorption apparatuses. One system was heated to 130 C, the other to 80 C. When the heating temperature was low, the condensation and dissolving of HCl was greater; compared to the sampling heated to 130 C, the decrease of the measurement was up to 60%. The sampling error with the same temperature condition was 1 to 8%.

27683

APTIC NO. 49985

Nakamura, Keigo

STUDY ON AN ANALYSIS METHOD FOR HYDROGEN CHLORIDE IN STACK GAS. (Haigasuchu no enkasuiso bunsekihoho ni kansuru kenkyu). Text in Japanese. IN: 1971 Research Report on Countermeasures for Hydrogen Chloride Gas Evolving from Refuse Incineration by the Japan Society of Public Health. Ministry of International Trade and Industry (Japan), Public Nuisance Resources Research Inst., p. 18-29, March 1972. 2 refs.

Sampling and analysis methods for hydrogen chloride gas discharged from incineration of city refuse were reviewed. Of the various applicable analysis methods, the mercuric thiocyanate method was discussed. Stipulated in JIS K0107, it is the method in which an alcohol solution of ferric ammonium sulfate and mercuric thiocyanate is added to the sample solution containing hydrogen chloride, making the sample solution develop a reddish orange color. Absorption of the solution is then measured spectrophotometrically at the wavelength of 460 nm. The value is compared to the absorption of the standard hydrogen chloride solution to obtain the concentration of the hydrogen chloride. The coloring reaction at 20 C was tested. It was immediate and became stabilized in about 5 hours with a maximum absorption at or about the 465 nm wavelength. The calibration curve representing relationship between concentration of hydrogen chloride and absorption is not always linear. It is linear only when the concentration is in the range up to 10 microliters/ml. The repetitive accuracy was very high with the standard deviation, 0.003; r, 0.01; and the variation factor, 0.73%. However, it tends to be affected by interfering ions such as chlorine, bromine, iodine, and cyanide. The measured value will be accurate within lower than 10% error if the sampler has no leakage and the conduit between the sampling tube and the bottle is kept heated at 120 C or higher. Using this analysis method, hydrogen chloride in the stack gas of small-sized incinerators used at schools and apartment buildings was analyzed. Although largely affected by the quality of the refuses, the concentration was in the range of 50-950 ppm.

27684

APTIC NO. 49476

Nestaas, I. and O. Bjorseth

SAMPLING AND MEASUREMENTS OF EMISSION. Preprint, Norwegian Society of Professional Engineers, Oslo, 22p., 1972. 3 refs. (Presented at the International Symposium on the Fluoride Problem in the Aluminum Industry, May 24-26, 1972.)

Equipment designed to sample hydrofluoric acid and solid fluorides in gases at primary aluminum smelters is described, as well as optimum selection of sampling sites, sampling duration, and sampling frequency for fluoride measurements. A sampler was tested in a laboratory; it was composed of a spray arrester designed to separate droplets larger than 50 micron, a cyclone to reduce the loading on the filter during long periods of sampling uncleaned gases, membrane type acrylonitril-polyvinyl chloride filters with a pore size of 1.2 micron, a temperature sensor, a gas drier and condensate collector to be used in cold weather, and sieve-tray gas absorbers with 5% monobasic potassium carbonate. Sampling outlay for a plant with 168 closed prebake 150 kA pots is described. Emissions from each of the three sections and the per-

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formance of the scrubbers were checked monthly by sampling ventilation air in one fan and uncleaned and cleaned pot exhaust, simultaneously. Gaseous and solid fluorides were sampled separately. Uncleaned pot exhaust was sampled in the center of horizontal ducts ahead of the scrubbers. Ventilation air was sampled below the fans to avoid segregation of solids due to centrifugal forces. Since emission of fluorides varies during the day, although not significantly, duration of sampling should be 24 hours. The annual average emission can be measured fairly accurately by sampling six sections four times a year.

27685

APTIC NO. 49186

Nishida, Konosuke, Tsuneo Honda, Masanobu Yamakawa, and Tadao Ando

DEVELOPMENT OF A SENSORY ODOR MEASURING APPARATUS. (*Shukido sokutei sochi no shisaku*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 166. (Nov. 7-9, Paper 121.)

As a basic study toward the development of an odor measuring apparatus, various factors affecting the sensitivity measurement method were examined. Threshold tests were given to three women in their 20s, one man in his 20s, and one man in his 40s in an environment of 22 C temperature and 55% humidity. With one kind of odor, the young man sensed the odor at 0.50 l/mm concentration and the old man sensed it at 0.90 l/mm. The three women recognized it in the area of 0.55 and 0.70. With another type of odor, the older man recognized it at a lower threshold than any other, at 0.65; the others reaction ranged between 0.80 and 0.90 l/mm. The threshold is in the area of 1.0 when the temperature is 25 C; it is as low as 0.3-0.4 when the temperature is 15 C. The point when the odor is no longer recognized ranges from 0.7 to 1.1 at 25 C and 40 to 80% humidity. The point tends to be lower when the humidity is higher. When the temperature is 15 C, the point is between 0.3 and 0.7. The flowsheet for an olfactometer is reproduced from another publication.

27686

APTIC NO. 49186

Nishimura, Shotaro, Chiyoe Yamanaka, Sadao Nakai, Shinzo Kitamura, Soichi Haji, Tomo Suzuki, Ichiro Sabe, Yoshiaki Kashiwara, Akio Chikada, and Jun Kobayashi

LASER RADAR SYSTEM FOR ANALYSIS OF ENVIRONMENTAL SYSTEMS. (*Kankyo shisutemu kaiseki no tame no reza reda shisutemu*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 134. 3 refs. (Nov. 7-9, Paper 89.)

The principle of the ruby laser radar (lidar) system is explained, and the equation based on the signaling power and the receiving power is given. By measuring the receiving power and the distance from the radar, the scattering intensity created by the particles in the atmosphere can be obtained. The on-line computer handling system is explained with a diagram. Pollutants are observed by the receiving telescope, go through the filter, photo-multiplier, preamplifier, sampling, A/D, and memory, which receives signals also from a mobile monitoring vehicle. The memorized data goes to the tape puncher, and to the digital computer; the sampling goes to the data line and the digital computer, which is ready for printing and CRT display.

27687

APTIC NO. 49715

() Keefe, A. E.

THE OLD, THE NEW AND THE FUTURE IN AIR POLLUTION INSTRUMENTS. Preprint, 14p., 1972(?).

Old and new air pollution measuring instruments are reviewed. The instrumentation and operating variables of the apparatuses used in various measurement methods are discussed, including: permeation tubes for diluting pollutant mixtures; apparatuses used in the chemical and ultraviolet or infrared ab-

sorption methods; a flame-photometric detector for sulfur gases in the chemiluminescent and gas chromatographic methods; a chemiluminescent nitrogen oxide detector; the chemiluminescent ozone instrument; nondispersive infrared instruments for measuring carbon monoxide; devices for microwave absorbance spectrometry; photofragmentation instruments; and devices for measuring sulfuric acid mist. Pollutants measured and analyzed with these instruments include sulfur oxides, phosphorus containing compounds, organic sulfur compounds, ozone, nitrogen oxides, carbon monoxide, methane, ethylene, and aromatic hydrocarbons.

27688

APTIC NO. 49237

Oikawa, Kikuo, Yoshito Okubo, and Katsunori Homma

DUST COLLECTION EFFICIENCY OF NEW STANDARD SAMPLERS. (*Fuyu ryushi jo busshitsu no kankyo kijun ni kakaru shoyoryo sanpura no kosho tokusei ni suite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 242. (Nov. 7-9, Paper 196.)

For eliminating particles larger than 10 micron, small quantity samplers such as the multi-level particle separator and the cyclone-type separator were designated as standard equipment. No verification of theoretical calculations has been given by actual measurements of the equipment. In this experiment, these two types of samplers were evaluated using an aerosol. The air flow rate was 20 l/min, and a standard aerosol was produced by a high frequency heating fume producer. Particles between 0.3-10 micron were produced. As for the multi-level separator, the limit particle size was near 10 micron, and the 50% permeation size was around 7-8 micron. A similar curve to the theoretical curve was obtained. The cyclone separator's limit was about 8-9 micron, when using a 6 mm diameter suction nozzle; when using a 7.5 mm diameter nozzle, it was about 10-11 micron. The 50% permeation was around 8 micron.

27689

APTIC NO. 49753

Oka, Shotaro

AUTOMATIC CHEMICAL ANALYSIS OF AIR POLLUTANTS EMISSION SOURCES. (*Taikiosen hasseigen no jido kagakubunseki*). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Kansai Branch, p. 19-25, 1972. (Presented at the Japan Society of Mechanical Engineers Kansai Branch, Lecture Meeting, 17th, Osaka, Japan, Dec. 5-6, 1972.)

Automated chemical analyzers designed to analyze air pollutants produced in most cases by combustion are introduced. For the continuous and automatic analysis of sulfur dioxide in flue gas, a non-dispersive infrared analyzer (NDIR) is used in Japan. Principles of this analyzer are briefly discussed. Chemiluminescence analyzers were introduced as automatic analyzers for continuous analysis of nitrogen oxides. Continuous analysis of hydrocarbon in automotive emissions is done by NDIR. Hydrogen flame ionization detectors are used when automotive exhaust gas is analyzed by the constant volume sampling method. Basics of flame ionization are described in some detail. The NDIR is considered the best method available today for continuous analysis of carbon monoxide. In the future, the development of high-sensitivity, high-accuracy analyzers, of an analyzer that can analyze a number of substances simultaneously and continuously, of a total monitoring system that can measure, predict, warn and control air pollution, of a wide-area air pollution monitor system such as laser radar, and of easy-to-use and maintenance-free analyzer, are needed.

27690

APTIC NO. 49235

Okita, Toshikazu and Hiroshi Yamashita

VARIOUS PROBLEMS IN THE MEASUREMENT OF AEROSOL USING LIGHT SCATTERING RECORDER (*Kosanran biryushi sokuteiki sokutei ni okeru shitsudo no*

mondai). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 240. (Nov. 7-9, Paper 194.)

The light scattering recorder for suspended particulates was added to the list of standard equipment for continuous measurements of air quality. Under high humidity, suspended particulates absorb vapor and grow in size, and the light scattering measurement is increased more than actual particulate concentration. Two meters, one in humid air and one in dry air by the use of a heater, were used to see the degree of particle growth and error in the measurement of particulates in a humid atmosphere. The ratio of the two meters were equal up to a relative humidity of 74; then the ratio of humid particulates/dry particulates began to grow to 1.10 at about 75, and to 1.20 at about 78%. The ratio stayed in the area of 1.10 and 1.27 for the rest. The highest growth 1.27 was in the area of 90% humidity.

27691

APTIC NO. 49512

Shigeta, Yoshihiro, Tomohiko Ishiguro, Takashi Hasegawa, and Tatsuo Kato

ANALYSIS OF TRIMETHYL AMINE BY FTD. (Netsu ionka kenshutsuki ni yoru tori mechiru amin no bunseki). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 120. (Nov. 7-9, Paper 75.)

Trimethyl amine is emitted from the fish offal treatment plant producing fishmeal or fertilizer. When the flue gas contains a lot of water, the usual measurement method is unsatisfactory because the painted reagent dissolves in water and the gas is adsorbed on the container. The tracer analysis of trimethyl amine was studied using the flame thermal ionization detector. Trimethyl amine in the test gas is absorbed in a 0.1 chlorine solution (10 ml) in a bubbler, and n-propylamine or another standard material is added. The liquid is concentrated by an evaporator, and 0.5 ml distilled water is added. Then the trimethyl amine is measured by a flame thermal ionization detector. A stainless insert was packed with 5 w/w% potassium hydroxide in 40-60 mesh teflon carrier. The most suitable material gasification temperature was between 100 and 200 °C. By this method, using 5 l of material gas, the detection of 10 ppb trimethyl amine became possible.

27692

APTIC NO. 49060

Smolinka, P. and H. Kahl

A METHOD FOR THE DETERMINATION OF LEAD AND ITS COMPOUNDS IN ATMOSPHERIC AIR. (Eine Methode zur Bestimmung von Blei und seinen Verbindungen in der atmosphärischen Luft). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12):926-928, 1972, 25 refs.

For the determination of lead and its compounds in the air, a modified form of the dithizone method is described which permits the measurement of a concentration of 0.5 micrograms lead/m³. The air containing lead particles is drawn through a membrane filter. The adsorbed particles are dissolved in nitric acid. After addition of dithizone, the lead dithizonate is photometrically determined. Bismuth, indium, and thallium interfere with the analysis, but generally these elements are not present in the atmosphere in interfering concentrations.

27693

APTIC NO. 49358

Stormont, John O. and Karl J. Springer

EVALUATION OF DIESEL SMOKE INSPECTION PROCEDURES AND SMOKEMETERS (FINAL REPORT). Southwest Research Inst., San Antonio, Tex., Air Pollution Control Office Contract EHS 70-109, APTD 1351, Rept. AR-835, 161p., July 1972, 11 refs.

NTIS, PB 212796

The measurement of diesel smoke opacity was investigated. Several smoke test procedures, intended for in use vehicle in

spection, were compared to a chassis dynamometer version of the Federal smoke compliance test. Several commercially available smokemeters had their performance compared to that of the standard Public Health Service end-of-line smokemeter. Special topics investigated were the comparison of opacity measurements from three identical PHS smokemeters and the correlation of the standard 10-inch diameter PHS smokemeter with the enlarged versions of 20-inch and 40-inch diameter. An inline version of the PHS smokemeter was developed. Inline and end-of-line opacity measurements were made simultaneously in order to determine the correlation between the two measurement techniques and also to determine the effect of certain exhaust variables, such as flow rate and temperature, on this correlation. Results of all tests are discussed. (Author summary)

27694

APTIC NO. 49993

Takeuchi, Junichiro

AN AIR POLLUTION MONITORING SYSTEM. (Taiki oven kanshi shisutemu ni tsuite). Text in Japanese. Kan-kyo Kenkyu (Environ. Studies), no. 2:87-93, Dec. 1972.

A monitoring system is required to carryout collection at automatic monitoring stations, analysis and tabulation of data (hourly and daily), publication of data, protection of data, transfer and exchange of data with superior systems or systems belonging to other local governments, watching of the system, and expansion of the system. In Aichi Prefecture, air pollution monitoring system has been in operation since July 1972, with 63 monitoring stations and flue meters attached to 40 boilers, which are telemeterized. Connected with an electronic computer, on line, real time treatment of data is being given. A pollution prediction model is being developed. Between the main telemeter office and the computer there is distance of a few km. Monitoring stations transmit 12 kinds of information (including sulfur dioxide, dust, carbon monoxide, nitric oxide, nitrogen dioxide, hydrocarbon, and oxidant concentrations, wind direction and velocity, temperature, and humidity), every 20 min to the telemeter main station. From boilers, emission concentrations are sent every 30 min. Concentration data are filed by day, station, and pollutant; meteorological data are also filed by day. In case of power failures, a subsidiary system takes over the function of the main monitoring system, so that there will be no break in data. In the case of failure of the subsidiary system, data is filled into a drum of the transmission system, and data is punched on a paper tape. A data base management system accumulates overall data related to air pollution, gives necessary data whenever necessary, and gives statistical data.

27695

APTIC NO. 49240

Tamori, Yukio, Nobuyuki Ogure, and Kazunari Imagami

THE ISOKINETIC DUST SAMPLER WITH CYLINDRICAL FILTER. (Ento toshi-shiki tosooku kyunkan no shisaku). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 238. (Nov. 7-9, Paper 192.)

Improvements were made on the null type sampling nozzle, which usually requires adjustment due to the turbulence in the nozzle and the pressure loss by friction. The test model is based on the principle of the null type sampling nozzle, but utilizes the cylindrical filter paper sampler structure. The external pressure (in the flue) is measured on the outer wall of the cylinder and the pressure in the nozzle is measured through the hole in front of the filter paper, and the pressures on both sides are balanced. The nozzle tip can be changed into various diameters depending on the flue gas speed. The filter paper size is large, and a large amount of sampling gas can be measured in a short time. The flow rate is 30-40 l/min.

MEASUREMENT METHODS

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APTIC NO. 49236

Taziri, Akihide, Kenichi Ueda, and Hiroshi Takuma

LASER SCATTERING MEASUREMENT OF AEROSOL PARTICLES. (Reza san ni yoru fuyu ryushi sokutei). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 241. (Nov. 7-9, Paper 195.)

A trial helium-neon laser was constructed. In order to examine the characteristics of light scattering of the laser, a preliminary experiment was conducted using a stearic acid aerosol. The light scattering angle distribution was 20 times over at 30 degree, of 90 degree distribution; and approximately 100 times over at 15 degree. But at each angle, the distribution was proportionate to the particle density. There was no clear effect of polarizing. The apparatus consists of the following parts: He-Ne, monitor, laser, detector, preliminary amplifier, 10 micron filter, amplifier, integration, counter, and integration to printer. The total circular spectrum of scattering light can be received, approximately 25 times over the light reception in three dimensional angle compared to the previous model. The 10 micron filter enables the laser to eliminate all particles larger than 10 micron without creating turbulence in the sampling air. This electronic filter is made of a level detection circuit and an electronic switch.

27697

APTIC NO. 49759

Tsujino, Yoshio

A PROCEDURE FOR CONVERTING NO TO NO₂. (No no sokuteiho ni tsuite no kento). Text in Japanese. Osaka-fu Kogai Kanshi Senta Chosa-Shitsu Kenkyu Hokoku (Proc. Res. Sect. Osaka Environ. Pollution Control Center, no. 3:57-58, Dec. 1972).

The nitrogen oxides, especially nitric oxide, contained in car exhaust gas and photochemical reactions usually do not respond to the Saltzman measurement method, because the NO must be converted into nitrogen dioxide. A solid oxidizing agent was used to make the efficiency of the conversion better. The oxidizing agent is prepared by dropping a solution of sodium bichromate in sulfuric acid on the glass fiber filter and drying it. When the sodium bichromate paper put between glass holders is used, the NO can be converted into NO₂ with a good efficiency, leaving the NO₂ present in the sample gas intact. In the experiment the three sodium bichromate papers were put between 2 centimeter diameter glass holders, and the efficiency of oxidation of NO was measured by introducing a standard NO gas (0.8 ppm) into the oxidation apparatus into which oxidizing papers are put at a rate of 100 ml/min to convert NO into NO₂, and by making a colorimetric analysis.

27698

APTIC NO. 49981

Tsujino, Yoshio

THE METHOD OF MEASUREMENT OF NITROGEN OXIDES IN AMBIENT AIR (I). INSTRUMENTAL RESPONSE TO RAPID FLUCTUATIONS IN POLLUTANT LEVELS. (Taikichu no chisso sankabutsu no sokutei ni kansuru kenkyu (I) - Shunkanchi no renzoku sokuteiho ni tsuite kento). Text in Japanese. Osaka-fu Kogai Kanshi Senta Chosa-Shitsu Kenkyu Hokoku (Proc. Res. Sect. Osaka Environ. Pollution Control Center), no. 3:1-6, Dec. 1972. 3 refs.

To clarify a mechanism of photochemical smog occurrence, the minute change in the concentration of nitrogen oxides must be measured exactly. Thus, a study on the continuous measurement of the instantaneous change in the nitrogen oxides was carried out. The absorption liquids used were liquid A (mainly composed of N-1-naphthyl ethylenediamine-2 HCl and glacial acetic acid) and liquid B (Composed of N-1-naphthyl ethylene diamine-2HCl, 2-naphthol-3, 6-disulfonic acid-2Na, and sulfanil amide). The absorption liquid was introduced by pump from the absorption liquid tank to the color comparison cells and then sent to a reaction tube. The air sam-

ple is sent to a reaction tube by a pump, and the reacted air in the reaction tube is sent to the air bubble separating device. Then the colored absorption liquid is sent to the color comparison cells, where the concentrations of nitrogen dioxide and nitric oxide are automatically recorded. Using the B absorption liquid, the detecting line agrees with the law of Beer within 0-1.0 microgram NO₂. Because the Saltzman factor is 0.80, this measuring apparatus can measure NO₂ in the range of 0-2.0 ppm.

27699

APTIC NO. 49618

Uetaki, Tomosada

TECHNIQUES FOR THE MEASUREMENT OF DUST.

(Funjin sokutei gijitsu ni tsuite). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 53-63, 1972. (Presented at the Seminar on Recent Technology of Public Pollution Control, 370TH, Fukuoka, Japan, Dec. 11-12, 1972.)

The gas flow rate is usually calculated by either Pitot tubes or orifice flowmeters, depending upon the dust concentration of the gas involved, where the dust content is fewer than 50 g/cu m of flue gas. In a flue gas where the dust content is more dense than this concentration only a special meter such as an equispeed gas suction tube can work. The measurement procedures of gas flow with Pitot tubes are specified in the Japan Industrial Standard B-8330, while the measurement procedures of dust concentration in a flue gas are detailed in JIS Z-8808. The text outlines many types of Pitot tubes, orifice flowmeters, equispeed gas suction tubes, and other dust samplers of diversified types including the Roken dust gauge, Funken dust gauge, thermal precipitator, cascade dust impactor, automatic dust collector, Tyndallscope, photocell dust collector, electrostatic dust collector, and dust impinger. Basic theories and formulae specific gravity of flue gas, weight and volume rates of the water content velocity of gas streams to be measured by Pitot tubes, dry and wet gas flow rates to be derived from velocity measurements, sucked gas rate to be measured by orifice meters, formula for the total energy difference between the outside and inside of suction tubes applied by Bernoulli's theorem, suction loss by the equispeed suction tube, characteristic curve of equispeed gas suction, Watson's formula for suction error in dust concentrations due to unequipped suction, experimental test results on Watson's formula for verification purposes, sedimentation speed of floating particulates in the open air versus particulate diameter within a range of 0-100 micron, measuring methods, and procedures of dust deposits are discussed.

27700

APTIC NO. 49431

Umeda, Hiroshi

A FEW ISSUES IN THE CHROMOTROPIC ACID METHOD FOR THE AMBIENT FORMALDEHYDE.

(Horumuarudehido no sokutei ho to shite no kuromotoropu-san ho ni okeru mondaiten). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 122. (Nov. 7-9, Paper 77.)

The problems in the chromotropic acid method of measuring formaldehyde are examined. The use of sulfuric acid high concentrate is not safe in the field tests, and high concentration can dilute formaldehyde. The method described by Boos involves 2 ml of test material, 0.2 ml of 0.5% chromotrope acid solution, and 5 ml of sulfuric acid concentrate. In this case the sulfuric acid concentration is 77.5%, yet the absorption photometry is higher than 86% concentrate. This method was examined and found not reliable, creating much fluctuation. The temperature created by mixing of sulfuric acid was suspected. After various tests, it was ascertained that most reliable results were obtained when the absorbent was mixed at the last stage, at the room temperature. The calibration line was almost straight. A 1 ppb concentration of formaldehyde could be easily detected by this method, when 1 cu cm was used with 1.0 ml absorbent under the condition of 1 l/min for

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60 min. The absorbent retained the absorption capacity at 35 C under the sunlight for 2 weeks. The color was less stable under the light rather than the temperature. It slightly yellowed in a brown jar, when refrigerated; but it could be used 2 weeks later.

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APTIC NO. 49284

Vergeiner, I.

VOLUME VISCOSITY IN A RAPIDLY EXPANDING GAS. *Arch. Meteorol. Geophys. Bioklimatol., Ser. A (Vienna)*, 21(4):431-440, 1972. 7 refs.

Theoretical considerations and calculations concerning the volume viscosity in rapidly expanding gas are presented. The peculiar behavior of air during rapid expansion or compression in a condensation nuclei counter at a temperature change of about 4 of the adiabatic value calls for an explanation in terms of viscous effects. The ordinary (shearing) viscosity, which multiplies the viscous terms in the standard form of the Navier-Stokes equations, is not only viscosity coefficient to be considered. In cases when the rate of expansion is large, volume viscosity must be reckoned with. Hence, both the ordinary (shearing) viscosity and volume viscosity are needed to explain the less-than-adiabatic temperature changes in a rapidly expanding or compressed gas.

27702

APTIC NO. 49454

Wang, Shou-I

ANALYSIS AND MINIMIZATION OF KRAFT SULFUR EMISSIONS. *Montana Univ., Missoula, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1972, 136p. 35 refs.*

Problems of the analysis and minimization of kraft sulfur emissions were studied. An automatic quantitative and continuous sulfur analyzer (coulometric titration) was developed and tested for a 6-month period in the laboratory and a 7-month period in the recovery furnace and the lime kiln area of a Kraft paper mill. This low cost, reliable instrument proved to be very stable and accurate. An automatic sampling system was incorporated with the sulfur analyzer. The instrument can automatically obtain gas samples from a stack and separate and analyze the mixture of sulfur-containing gases in 10 min. The sensitivity is 0.01 ppm total sulfur compounds. Selective membrane filters and solid phase chemical scrubbers were developed. These membrane filters are used to retain undesirable sulfur gases from the sampling gas. A stepwise multiple linear regression program was used to relate the operating conditions of a recovery furnace unit and a lime kiln unit to their sulfur emissions. The correlations obtained by mathematics are explained in terms of the actual process variables. With few exceptions, the mathematics can be explained logically in terms of what is actually happening in the process. (Author abstract modified)

27703

APTIC NO. 49436

Watanabe, Ikuo, Toshikazu Okita, Shigeru Kiyono, and Hiroshi Murabayashi

ANALYSIS OF AROMATIC HYDROCARBONS IN AMBIENT AIR. (*Gasu kuromato gurafu ni yori taiki-chu hokozoku tanka suiso no bunseki*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th 1972, p. 117. 1 ref. (Nov. 7-9, Paper 72.)*

A gas chromatography flame ionization analysis method for aromatic hydrocarbons is discussed. The lengths of column, temperature, and single or combined use of packing material are examined. A 28-foot column of BNT 34 plus DHD was used with an attachment of 1500 ft of 1/8 in. in order to avoid the fluctuation of the baseline due to the liquid flow-out. Operating variables were examined for the flow quantity, baseline fluctuation, and other details. A 60 sec oxydipropion nitril (ODPN) column was effective in separating the chain and aromatic groups of HC, and the results greatly depended on the

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temperature. This column was used specifically for separation. The low class portions of HC flowed out when the column temperature was zero, and went to a DMS column, then the passage was converted and back flush was caused; simultaneously the temperature was raised to 80 C, and aromatics were led to the BNT column. By this method, the peak deformity was almost completely eliminated. The calibration method is briefly explained, and a chromatogram is presented.

27704

APTIC NO. 49125

Yamane, Yasuhiro, Genichi Miyazaki, Hiroyuki Nakazawa, Shoji Bando, and Tsuyoshi Imabashi

EMISSION SPECTROSCOPIC AND ACTIVATION ANALYSES OF TRACE ELEMENTS IN SUSPENDED PARTICULATES. (*Taiki fuyu biryushi-chu biryo genso hakko bunko oyobi hoshaka bunseki ni kansuru kenkyu*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 89. (Nov. 7-9, Paper 44.)*

A simplified method of measuring traceable elements in suspended particulates was tried, using direct current arc and powdered material. A low volume air sampler with a millipore membrane filter (47 mm diameter) was used for sampling the air at 30 l/min for 2 weeks. Three-eighths of the filter paper was used for spectrophotometric analysis of 1/2 was used for radioactivity activation analysis. For spectrophotometric 0.03% of palladium and 0.3% strontium were added to the mixture of the filter paper and buffer; the material was crushed to powder in a mixer mill. Approximately 29.7 mg was packed in a cup electrode and 12 amp direct arc was applied for 45 sec. For analysis of vanadium, the material was irradiated in JRP 2 pipe for 5 sec, and for manganese, it was irradiated for 1 min and photoelectric peak was used for determination. The measurements were taken by Ge (Li) detector extension 400 channel wave analyzer. As a buffer for the spectrophotometric material, various solutions were tried with different amounts of graphite. The best result was obtained by one portion of sodium chloride and 3.5 portions of graphite. The measurements by these methods are presented in tables. Chromium, copper, iron, lead, nickel, and zinc were measured.

27705

APTIC NO. 49113

Yamazaki, Hiroyasu, Kazuhiro Kuwata, and Ken Matsuo

ANALYSIS OF GAS EMISSIONS FROM A PAINT FACTORY BY COMBINED GAS CHROMATOGRAPHY-MASS SPECTROMETRY. (*Gasu kuromatografi shitsuryo bunsekiho (GC-MS) ni yoru toso kogo no haigasu bunseki*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 128. (Nov. 7-9, Paper 81.)*

The combination of gas chromatography (GC) and mass spectrometry (MS) was used for the analysis of flue gas from a paint factory and good results were obtained. Flue gas was sampled by a handy sampler by drawing 1 l/min of gas for 30 min from the flue into methanol cooled by dry ice. The composition of the flue gas was confirmed to be exactly the same as that of solvent used in the paint. Therefore, for determination of each element by GC-MS, the paint solvent was used. The elements which appeared in each peak by GC separation were continuously led into MS, and spectrum was taken while monitoring. After the adjustment of the background, each element was identified by comparing with the standard table, and then measured by a flame ionization detector. From 60 to 70% of the elements were aromatic hydrocarbons, and m,p-xylene, O-xylene, 3-ethyl toluene, 4-ethyl toluene, methylylene, psoid kumene, hemimeritene, and butylcellosolv were recognized. The excellence of this method for analysis of flue gas was confirmed.

MEASUREMENT METHODS

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APTIC NO. 49259

Yamazaki, Hiroshi and Kazuyuki Aoki

PROBLEMS AND MAINTENANCE OF AIR POLLUTION MONITORING STATIONS IN TOKYO. (Tokyo-to ni okeru taiki oson sokuteishitsu no kanri to mondai). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 130. (Nov. 7-9, Paper 85.)

The Tokyo Metropolitan Government has 34 monitoring stations as of Aug. 1972. The problems of maintenance and improvements were examined. The structure of a monitoring station is as follows: sampling collector, pollutant and meteorological measurement equipment, the communication system, the receiving section, and the data handling system. Some problems are: continuous management and maintenance, handling of emergency and damage, periodical inspections, the problem of overhauling, and exchanges of parts and equipment. The data must be useful in judging actual pollution conditions in reference to the environmental standards, in smooth handling of emergency measures in order to prevent acute and unpredictable pollution, in grasping an over-all picture including non-polluted areas, and in developing city plans, installation of public roads, and pollution control measures. The data must be accurate, precise, quickly obtainable, and reliable at as little cost as possible.

27707

APTIC NO. 49992

Zurlo, Nicola

TECHNICAL CONSIDERATIONS ON THE ANALYTICAL METHODS INCLUDED IN THE REGULATION TO BE APPLIED BY THE INDUSTRY ACCORDING TO LAW NO. 615. (Considerazioni tecniche sui metodi di analisi del regolamento di applicazione per l'industria della legge 615). Text in Italian. Chim. Ind. (Milan), 54(9):801-804, Sept. 1972. (Presented at the Giornate della Chimica, 23rd Convegno, Milan, Italy, April 19-20, 1972.)

The antismog law No. 615 stipulates maximal permissible concentrations for all major industrial pollutants at 2 levels, i.e., 30-minute median concentrations for nine substances, and 24-hour median concentrations which are 3-4 times lower than the 30-minute concentrations. The median annual concentration is 15-20 times lower than the 24-hour concentration. Only the more precise and generally used measurement methods are permissible and these are stipulated in the regulation. Particulates are determined gravimetrically by a 5 cm membrane filter where a major source of error is the variation in the weight of the filter. Free silica is analyzed by the same method as inert dusts, but it is complex and subject to errors. The colorimetric method is prescribed for sulfur dioxide. If this method yields equal or a little lower values than the analysis of SO₂ and sulfur trioxide combined then the presence of sulfates can be excluded. If the difference is large then it can be due to sulfate or to free sulfuric acid which must be determined. Nitrogen oxides are determined by the Saltzman method; for 24-hour median levels absorption with soda and subsequent colorimetry is prescribed. The methods leave much to be desired and all that can be done is to follow scrupulously the prescribed procedure. Chlorine is determined by the orthotolidine method, hydrogen chloride by the sulfocyanide reaction, hydrofluoric acid by colorimetry with a zirconium alizarin indicator or by a specific electrode, sulfuric acid by the methylene blue method or by a specific electrode, lead by colorimetry or by atomic absorption, carbon monoxide by the infrared method or by the iodine pentoxide method.

1971

27708

APTIC NO. 49835

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Fachgruppe Staubtechnik

MEASUREMENT OF WORKPLACE DUST CONCENTRATION. PARTICLE COUNTING. MEASUREMENT BY MEANS OF MEMBRANE FILTER. (Messung der Staubkonzentration am Arbeitsplatz. Messung der Teilchenzahl. Messen unter Benutzung von Membranfiltern). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, no. 2266(3):1-4, Dec. 1971. 6 refs.

Dust sampling by means of membrane filters and microscopic particle counting methods adopted for membrane filter sampling is described. The membrane filter, made of a cellulose ester or a thor polymer with an average pore size of 0.3 micron, is heat resistant up to 125-180 °C, and has a specific permeability of 3-4 cu cm/sec/sq cm. Membrane filters used in workplace dust sampling are usually below-operated. Particle counting by means of an incidental light microscope is done by forming arithmetic means of the particle counts for individual fields. The use of color filters permits the selective counting of different components of composite dusts. Counting by means of a transmitted light microscope is possible by means of a transparent membrane filter, dissolved e.g., in acetone, or according to the phase contrast procedure, the latter is suitable for qualitative assessment.

27709

APTIC NO. 49836

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Kommission Reinhaltung der Luft

EVALUATION OF DUST CONCENTRATION MEASUREMENTS IN GAS FLOWS. CONTINUOUS PROCESSES. (Auswerten von Staubkonzentrationsmessungen in stromenden Gasen. Kontinuierliche Prozesse). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 2465(1):1-3, May 1971.

A guideline for the evaluation of continuous dust concentration measurements in gas flows under sufficiently constant operating conditions is presented. The arithmetic mean of the measured dust concentration over the sampling duration is regarded as single reading, assuming standard distribution of the single readings. The dispersion in the single reading is dependent on the measuring techniques and especially on the magnitude of the single reading whose contribution to the dispersion, however, can not be predicted reliably. A minimum of two single readings are necessary for dust concentration measurement. A confidence of 95% is adopted for more than six random samples within one measurement series. A given maximum allowable dust concentration is regarded as not exceeded if the arithmetical mean from at least random samples is smaller than or equal to the maximum allowable concentration value. The procedure for the elimination of extremes from a series composed of at least three readings is described.

27710

APTIC NO. 49879

Sira Inst., Chislehurst (England), Market Research Section

POLLUTION AND ITS CONTROL: THE ROLE OF INSTRUMENTATION TO 1980. A STUDY OF THE UK SITUATION. Rept. SBN 9501842-2-5, 140p., 1971. 40 refs.

The form and nature of monitoring requirements with respect to air and water pollution and present and future demand in the field are reviewed. Pollutants and their sources, instrument applications, and technological developments are examined. The markets for pollution monitoring devices were calculated, including the trends of use of smokeometers, light interference instruments, and opacity measurement devices for smoke monitoring; titration techniques, gauges, and lead dioxide candles for sulfur dioxide determination; nondispersive infrared methods for the determination of SO₂, carbon dioxide, carbon

monoxide, and hydrocarbons; carbon monoxide monitors with thermal detection; chemiluminescence techniques for nitrogen oxides; and flame ionization detectors for hydrocarbons. The more recent developments include an automatic continuous recording meter based on the chemical reduction of SO₂, laser-Raman devices for CO, NO_x, and SO₂; correlation spectrophotometers for NO_x; fluoride monitors; odorimeters for atmospheric measurements; flame photometric detectors for SO₂, ozone measurement techniques based on chemiluminescence; and techniques for monitoring lead compounds in car exhaust.

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APTIC NO. 49880

Scott Research Labs., Inc., San Bernardino, Calif. and TRW Systems Group, Redondo Beach, Calif.

VEHICLE EMISSIONS SURVEILLANCE STUDY.
APRAC Proj. CAPE-13-68, 178p., Aug. 20, 1971. 9 refs.

NTIS: PB 206818

Optimal procedures are recommended for conducting an automobile exhaust emissions field surveillance program to characterize vehicular emissions for specific regions of the United States. Surveillance test cycles were limited to varying numbers of replications of the basic seven-mode test cycle. The test procedures included the use of the current Federal procedure. Quantitative error models were developed relating hydrocarbons, carbon monoxide, and nitrogen oxides emission measurement variability to the independent parameters which define test procedures and to the performance of basic test equipment. Then capital and operating costs were evaluated and a figure-of-merit system was established and used to evaluate the relative merit of a selected set of surveillance program options. Historical data were first reviewed and used to establish error models. Procedures were developed for rapidly cooling vehicle power trains to temperature states near ambient before emissions testing as well as for establishing a stabilized hot operating temperature condition. The synthesized data were then used to construct a mathematical model to evaluate the impact of various procedures and equipment on the figure of merit. The number of cycle replications had the greatest impact on the total emission standard area. The most cost-effective test procedure involving more than 100 vehicles is to condition the power train to a stable operating temperature and to perform a hot cycle emission test using five cycle replications. An increase in the confidence level from 95 to 99% requires nearly twice as many vehicle tests and therefore increases the cost.

27712

APTIC NO. 49971

Inst. National des Industries Extractives, Liege (Belgium)

ANNUAL REPORT 1970. (*Rapport 1970*). Text in French.
Ann. Mines Belg., no. 3:249-334, March 1971.

Parts of the Belgian mining industry 1970 annual report are presented. A new method for the determination of heavy hydrocarbons in flue gases requires Chromosorb for sampling. The sample adsorbed on Chromosorb is desorbed thermally for gas chromatographic determination. Prolonged sampling at a rate of 1-2 l/hr is possible, and Chromosorb cooled to the temperature of liquefied nitrogen is also suitable for the adsorption of light hydrocarbons. Scanning microscopes and electron microscopes, unlike light microscopes, have proved to be applicable to studies of asbestos fibers. Solid pollutants are sampled by means of membrane filters at a rate of 60 cu m/hr over 6 hr for gravimetric determination. Gasoline vapor in the air is sampled by a membrane pump at a rate of 1.5 l/min for adsorption on charcoal. The sample thus obtained is again absorbed by isobutyl alcohol for vapor phase chromatographic determination. A smoke and sulfur dioxide monitoring system of 31 sampling stations applies continuous sampling by means of paper filters for particles smaller than 10 micron, and an oxygenated water-containing bubbler for the conversion of SO₂ into sulfuric acid. The evaluation of the samples is done in laboratory. Systematic investigations of the dust and SO₂

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concentrations in an industrial agglomeration revealed high pollution levels of both dust and SO₂.

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APTIC NO. 49795

Day, Alan G., III, David P. Beggs, Marvin L. Vestal, and Wm. H. Johnston

IMPROVED INSTRUMENTATION FOR DETERMINATION OF EXHAUST GAS OXYGENATE CONTENT. ANNUAL REPORT. Scientific Research Instruments Corp., Baltimore, Md., Air Pollution Control Administration and Coordinating Research Council Contract CAPE 11-68 (1-69), Rept. SRIC 71-6, Rept. APTD-1294, 79p., April 1971. 6 refs.

NTIS: PB 210251

The application of chemical ionization mass spectrometry to the instrumental analysis of oxygenates in automobile exhaust gases is described. Initial monitoring experiments demonstrated the capability of this technique to simultaneously measure the instantaneous concentration of formaldehyde, acetaldehyde, valeraldehyde, acrolein, propionaldehyde, crotonaldehyde, butyraldehyde, valeraldehyde, benzaldehyde, and the total aldehyde concentrations. Preliminary field evaluation established the accuracy and reliability of the instrument via suitable reference tests. The ability of this instrument to simultaneously follow changing concentrations of nine oxygenates was also verified. The presence of significant amounts of hydrocarbons in the exhaust gas interfered with the measurement of acrolein, crotonaldehyde, benzaldehyde, and toluvaldehyde. Research resulted in the utilization of ammonia as a reagent gas to overcome this problem and to ionize selectively the unsaturated aldehydes in the presence of hydrocarbons. An improved calibration procedure and inlet system were developed. The incorporation of these improvements into the system along with the use of ammonia as an alternate reagent gas has eliminated most of the major problems of the instrument. (Author abstract modified)

27714

APTIC NO. 49959

Hinkley, E. David, J. O. Sample, T. E. Stack, A. Wilson, J. H. Boghos, S. Duda, W. F. McBride, J. N. McMillan, W. H. Laswell, and R. J. Woods

DEVELOPMENT AND APPLICATION OF TUNABLE DIODE LASERS TO THE DETECTION AND QUANTITATIVE EVALUATION OF POLLUTANT GASES. (FINAL TECHNICAL REPORT). Massachusetts Inst. of Tech., Lexington, Lincoln Lab., Environmental Protection Agency Contract F19628-70-C-0230, TR EPA-R2-72-090, 63p., Sept. 30, 1971. 10 refs.

NTIS: PB 214240

The development and application of tunable semiconductor diode lasers to problems associated with the monitoring of pollutant gases are examined. During the initial phases, lasers were developed to operate in the 8.7 micron region where sulfur dioxide has a strong infrared absorption band. A theoretical spectrum for this band of SO₂ was in near perfect agreement with the observed laser spectra once the band center used in the theory was properly adjusted on the basis of the laser data. The rate of pressure broadening of SO₂ lines by air was measured by laser spectroscopy and determined at 12 MHz/torr for the full width at half-maximum, yielding an atmospheric pressure-broadened linewidth of 0.30/cm. Similar measurements for ammonia in the 10 micron region gave values of 6.3 MHz/torr and 0.16/cm, respectively. Other applications studied included point sampling, white cell operation, long path transmission, and interferences. (Author summary modified)

27715

APTIC NO. 49819

Knutson, Earl Owen

THE DISTRIBUTION OF ELECTRIC CHARGE AMONG THE PARTICLES OF AN ARTIFICIALLY CHARGED

MEASUREMENT METHODS

27720

AEROSOL. Minnesota Univ., Minneapolis, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Dec. 1971, 220p. 49 refs.

One application of unipolar charging of aerosols is in the electrical method of particle size analysis. Problems of the relationship between charge and size of artificially charged particles, and of the improvement of the electric mobility method as a tool for the study of the particle charge distribution in monodisperse aerosols were investigated. It is proposed that the case where the particle exposure conforms to the negative exponential distribution, serves as a theoretical upper limit on the spread of the charge distribution. The corresponding standard deviation, assuming diffusion charging, is of the order 12dp charge units, with dp expressed in microns. Sonic jet charge with turbulent mixing, and triode charger maintaining laminar flow were employed in experiments to charge essentially monodisperse aerosols. The aerosol was either dioctyl phthalate of 0.4 to 1.0 micron, or polystyrene. The initial charge was either zero or Boltzmann equilibrium. The concentration in the charger was varied up to about 300 particles/cu cm. An electric mobility analyzer of coaxial cylindrical type with continuous through flow was employed. The aerosol composition, concentration, and initial charge had no effect on the charge distribution after unipolar charging. For the sonic jet charger, the standard deviation of charge was about 8 dp units, increasing slightly with charger flow rate. For the triode charger, the standard deviation was about 5 dp units, independent of flow rate. Thus neither charger achieved optimum uniformity in unipolar charging. The charging uniformity seems to be improved by modified flow field.

27716

APTIC NO. 49890

Kobayasi, Takao and Humio Inaba

LASER BEAM TECHNOLOGY FOR REMOTELY SENSING INVISIBLE MOLECULES IN THE POLLUTED ATMOSPHERE. Inst. of Electrical and Electronics Engineers, 11th, New York, Proc. Symp. Electron, Ion, Laser Beam Technol., 1971, p. 385-402. 33 refs.

Some experimental and theoretical studies on the laser-radar technique for remote sensing of invisible air pollutants are described. Four schemes are compared in terms of their respective functional capabilities and performances. The Raman backscattering or laser-Raman scheme was demonstrated experimentally to detect specific pollutants in the atmosphere. By incorporating an ultraviolet pulsed nitrogen or a Q-switched ruby laser, many molecules, including sulfur dioxide, nitric oxide, carbon dioxide, hydrogen sulfide, methane, carbon monoxide, and formaldehyde in the polluted air, as well as nitrogen, oxygen, and water vapor in the ordinary air, were identified separately by spectroscopic analysis. The combined scheme of fluorescence and resonance Raman backscattering was examined by using a frequency tunable dye laser pumped by a pulsed nitrogen laser. The resonance scattering scheme for detecting metallic vapor pollutants is discussed. An absorption scheme for measuring average or total concentrations of atomic and molecular pollutants over the optical path is considered. Theoretical expressions are derived for estimating scattering cross section, minimum detectable concentration, and range capability of these four schemes. (Author abstract modified)

27717

APTIC NO. 49731

Lindvall, Thomas and Leif T. Svenson

UNPLEASANTNESS - MATCHING IN OLFACTION. Stockholm Univ. (Sweden), Psychological Labs., Rept. 341, 8p., Dec. 1971. 16 refs.

Five different odorants were produced through different combustion procedures of animal manure. These were three different electrical combustion units, one gas-fed furnace, and one oil-fed furnace. Hydrogen sulfide was matched to these odorants. The psychophysical method used was an equality production method with regard to unpleasantness. Thirty sub-

jects participated in one large-scale experiment. Power functions described the group data well for the five intramodal matchings. The exponents for these equal-sensation functions ranged from 0.4 to 0.5. This indicates a relative invariance of the combustion procedure on the exponent. The different combustion procedures resulted in different levels of odor intensity for equal concentration relative absolute thresholds. The experiment demonstrated the practical applicability of psychophysical methods in environmental health research. (Author abstract)

27718

APTIC NO. 49952

Stanley, Elizabeth Colelli

ANALYSIS OF GASES UTILIZING SENSITIVE AND PRECISE ULTRAVIOLET ABSORPTION SPECTROPHOTOMETRY. Illinois Univ., Urbana, Dept. of Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Nov. 1971. 103p. 66 refs.

Instruments and procedures for the analysis of gases by means of sensitive and precise ultraviolet absorption spectrophotometry were developed. The instrumentation is composed of a Heath 701 Single-Beam Spectrophotometer, a light source with deuterium and tungsten lamps, a 0.35 m Czerny-Turner monochromator and wavelength drive, a sample compartment, photomultiplier module, and analog readout via a log-linear current module coupled with a servo recorder. For quantitative measurements, an alternating wavelength module was constructed. The possibilities of performing a direct analysis, based on ultraviolet and visible absorption characteristics, were examined for several gases. Ammonia, carbon monoxide, nitric oxide, nitrogen dioxide, ozone, and sulfur dioxide were all identified by their absorption spectra in the region between 1900 and 2000 Å. Although some derivative spectra were recorded, most observations were made with a recording single-beam spectrophotometer or the ratio-recording alternating-cell spectrophotometer.

1970

27719

APTIC NO. 49942

Coordinating Research Council, Inc., New York, Sub-Panel on Hydrocarbon Measurements

COOPERATIVE EVALUATION OF TECHNIQUES FOR MEASURING HYDROCARBONS IN DIESEL EXHAUST. Proj. CRC-APRAC-CAPI-1-64-1, Rept. CRC 431, 37p., Feb. 1970.

NTIS: PB 206730

Techniques for measuring total hydrocarbons in diesel exhaust were evaluated by 13 laboratories in succession using gas chromatographic analysis, flame ionization detectors, and non-dispersive infrared analysis. The standard deviation of the measured concentrations was on the order of 50% of the median values, reflecting either true differences in the exhaust samples, differences among the laboratories in handling the samples, or differences in instrument responses. Laboratory sampling techniques appeared to be a major source of the variation. (Author abstract modified)

27720

APTIC NO. 49721

Craig, D. K.

AEROSOL TECHNOLOGY STUDIES. In: Pacific Northwest Laboratory Annual Report for 1969 to the USAEC Division of Biology and Medicine. Volume I. Life Sciences. Part I. Biological Sciences. Battelle Memorial Inst., Richland, Washington, Pacific Northwest Labs., p. 53-54, Aug. 1970.

NTIS: BNWL-1306, Part I

An examination of the characteristics of an aerosol as determined by several types of sampling instruments is discussed. Instruments utilized included a thermal precipitator, a point-to-

plane electrostatic precipitator, cascade impactors, rotameters, spinning disc generators, vapor condensers, and cyclones. Aerosol characteristics studied included particle size distribution, flow rates, and concentration. The generation of constant concentrations of aerosols, suitable for chronic inhalation experiments, from dry powders of various materials was investigated.

1969

27721

APTIC NO. 49548

Shell Development Co.

DETERMINATION OF SULFUR TRIOXIDE AND SULFUR DIOXIDE IN STACK GASES. ABSORPTION-TITRATION METHOD. *Shell Method Series 62/69*, 8p., 1969.

In the title procedure, the gas sample is drawn through a probe containing a filter to remove particulates, and the gas enters three glass plate absorbers. The gas train is then purged with nitrogen to transfer SO₂, which is dissolved in the first two absorbers, to the third absorber to complete the separation of the two components. The sulfate resulting from the SO₃ absorption is titrated with lead perchlorate, and the sulfate resulting from SO₂ absorption is titrated by hydrogen peroxide.

27722

APTIC NO. 49949

Gogolinski, H.

AN EXAMPLE OF CALCULATING DUST CONTENT IN DUCT-CARRIED GASES ON THE BASIS OF EXISTING RECOMMENDATIONS. *Air Conserv. (English translation from Polish of: Ochrona Powietrza)*, 3(2):49-54, 1969. 1 ref.

NTIS: TT 70-55123/2

The concentration of dust in a gas before it enters a bag filter for cleaning gaseous emissions from a rolldown furnace for crude zinc-oxide production was calculated. Measurements were made in a horizontal section of the duct preceding the filter. The round cross section was divided into five composite surfaces. The dust content was measured by a dust meter with a speed probe, measuring filter, and double orifice located before the industrial filter. The dust mass and concentration were 211 g and 17.74 g/cu m, respectively.

27723

APTIC NO. 49950

Jozsko, H.

DETERMINATION OF LOW ATMOSPHERIC CONCENTRATIONS OF PHENOL AND CRESOL. *Air Conserv. (English translation from Polish of: Ochrona Powietrza)*, 3(2):31-41, 1969. 17 refs.

NTIS: TT 70-55123/2

A spectrophotometric method combining colorimetry and photometry was adopted to determine low concentrations of phenol (in the range 0.002 to 0.008 mg/50 ml) and cresol (in the range of 0.02 to 0.1 mg/50 ml). Direct analysis of phenol and cresol components in the mixture was not possible because their extinction maxima closely correspond to each other. The relation between the reagents concentration and color fastness, between extinction and concentration, and between time and color fastness were studied.

1968

27724

APTIC NO. 49900

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Fachgruppe Staubtechnik

MEASUREMENT OF WORKPLACE DUST CONCENTRATIONS. PARTICLE COUNTING BY MEANS OF

AIR POLLUTION ABSTRACTS, JUNE 1973

THERMAL PRECIPITATOR. (*Messung der Staubkonzentration am Arbeitsplatz. Messung der Teilchenzahl. Messen mit dem Thermalpraecipitator*). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 2266(1):1-6, Aug. 1968. 28 refs.

Thermal precipitators suitable for workplace dust measurement and microscopic particle counting procedures are described. Thermal precipitators are suitable for the quantitative separation of the finest particles without causing changes in the original size distribution. A temperature gradient several thousand C is maintained between two plates between which heating wire or band is placed, the gap between the two plates being a few tenths of a cm. The temperature maintained by means of heating wire or heating band is 170-180 C and at 80-85 C, respectively. The respective suction rates for heating wire and heating band precipitators are up to 7 cu cm/min and 10-12 cu cm/min. When particle size fractions below 5 micron only are to be assessed for hygienic studies, a preliminary settling stage is applied. A minimum amount of 1000-2000 particles should be counted under a light microscope to obtain a statistically secured size distribution. Electron microscopic investigations of thermal precipitator samples require representative distribution in the center part of the precipitator plate, which is best achieved by means of a heating band precipitator. Efforts to automatize particle counting such as by means of flying spot scanning have failed so far to acquire practical interest.

27725

APTIC NO. 49970

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Fachgruppe Staubtechnik

MEASUREMENT OF WORKPLACE DUST CONCENTRATIONS. PARTICLE COUNTING. MEASUREMENT BY MEANS OF KONIMETER. (*Messung der Staubkonzentration am Arbeitsplatz. Messung der Teilchenzahl. Messen mit dem Konimeter*). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 2266(2):1-7, Aug. 1968. 25 refs.

Workplace particle sampling by means of konimeter and microscopic evaluation procedures are described. The high flow rate produced by the conically reduced konimeter nozzle as well as the abrupt change in flow direction cause particles above a given size limit, e.g., 5 micron, to impact on and to be caught by an adhesive-coated konimeter plate. A conical nozzle with smooth inner surface, a short distance from the end of the nozzle to the konimeter plate, e.g., 0.5 mm, and a high flow rate of at least 50 m/sec are required for konimeter dust sampling. Konimeters may be designed for continuous operation or for fractionation. There are still no commercial type automatic discontinuously operating konimeters available. An SH model konimeter contains a nozzle 36 mm in length which is reduced from 1.8 to 0.5 mm and 36 indexed konimeter plates and a built-in microscope. Since konimeters deliver instantaneous concentration values, averages can be obtained by repeated samplings at certain intervals. Counting is possible by means of a normal or projection microscope, and the counting procedure is facilitated by the use of a quartz plate or through the removal of the adhesive coating. Particle size analysis requires at least 1000-2000 particles to be counted.

27726

APTIC NO. 49787

Lutsep, Helmut

DETERMINATION AND REACTIONS OF SULFUR DIOXIDE IN AIR. *Colorado Univ., Boulder, Analytical Chemistry Facility, Thesis (Ph.D.)*, Ann Arbor, Mich., Univ. Microfilms, Inc., 1968, 170p. 58 refs.

The colorimetric pararosaniline method for the determination of sulfur dioxide, the reactions of SO₂ with selected metal oxides, and reactions in photolyzed mixtures of air containing n-hexane and nitrogen dioxide were studied. An examination of the pararosaniline method revealed an increase by 0.3 absorbance unit in the gross absorbance of the colored reaction product from pH 1.15 to pH 1.73. Sulfur dioxide in controlled air mixtures at 8 to 18 ppm was allowed to react with alumina.

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calcium oxide, chromic oxide, ferric oxide, ferrosiferrous oxide, lead monoxide, lead dioxide, and vanadium pentoxide at room temperature. The rates of SO₂ removal by the different oxides were 4%/min for hydrous FeO₃, 6%/min for PbO, 2%/min for PbO and negligibly low for both Cr₂O₃ and V₂O₅. Alumina and CaO had removal efficiencies of 100% and 85% respectively. Air mixtures containing up to 21 ppm SO₂ and an equimolar amount of n-hexane were combined with 15% NO₂ for ultraviolet irradiation. Mixtures kept in the dark showed no SO₂ conversion, while irradiated samples had conversion rates ranging from zero to 25%. When the NO₂ concentration was increased to 410 ppm the SO₂ conversion was not found to increase upon irradiation. However, about 30% conversion was measured in the gas phase when the NO₂ and n-hexane concentrations were increased respectively to 2000 ppm and 3142 ppm, with a SO₂ concentration of 21 ppm and irradiation for 60 min. The reaction products were not positively identified on gas chromatograms.

1967

27727

APTIC NO. 49968

Lepper, James M., Jr.

PASSIVE IR SO₂ SENSOR. (FINAL REPORT). Dalmo Victor Co., Belmont, Calif., Public Health Service Contract BSS-EH, R-3253-4589, 49p., Oct. 1967.

A remote operating passive infrared sensor was developed for the quantitative measurement of sulfur dioxide in the field. The general problem of quantitative analysis, measurements in situ, the mathematical development, design criteria, laboratory and field set-up, operation, and application are reviewed. The instrument is a four color radiometer with an orthogonalized ratio computer which calculates the ratio of SO₂ radiation at 8.7 micron to the carbon dioxide radiation at 9.4 micron. The spectral overlap for each of the four signals is stored in the computer. The mixed signals from the four channels are separated by summing appropriate amounts of each channel. (Author abstract modified)

1965

27728

APTIC NO. 49967

Lepper, James M., Jr.

FINAL REPORT FOR STUDY OF INFRARED TECHNIQUES FOR MONITORING STACK GASES. Dalmo Victor Co., Belmont, Calif., Public Health Service Contract BSS-EH, R-3159-3954, 57p., Oct. 12, 1965.

Industrial stack plumes were studied by infrared sensors to determine the feasibility of pollution efflux monitoring by remote observation. Data was obtained using a wide-range high-sensitivity infrared spectrometer with a telescope assembly. Emission spectral reference tests were performed for carbon dioxide, sulfur dioxide, water, and air mixtures to determine instrument efficiency. The principle of operation, design criteria, analytical techniques, mathematical calculations, and calibration are reviewed. The instrument was tested on plumes from a coal burning power plant, a natural gas burning power plant, an open burning natural gas flame, and a malfunctioning petroleum refinery. Pollution densities over 0.3% were readily determined quantitatively for most gases when the plume temperature was over 200 F and when a small-to-moderate amount of particulate or other gray body radiation was present. (Author summary modified)

27729

APTIC NO. 49831

Morrison, Milton Edward

THE RATE AND MECHANISM OF THE AIR OXIDATION OF PARTS PER MILLION CONCENTRATIONS OF NITRIC OXIDE. (I). THE QUANTITATIVE DETERMINATION OF PART PER MILLION QUANTITIES OF

NITROGEN DIOXIDE IN NITROGEN, OXYGEN, AND UP TO 75 PPM OF NITRIC OXIDE BY ELECTRON-CAPTURE DETECTION IN GAS CHROMATOGRAPHY. (II). California Inst. of Tech. Pasadena, Dept. of Chemical Engineering. Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1965, 227p. 59 refs.

The air oxidation of ppm concentrations of nitric oxide was studied in a constant-volume, batch reactor, and a gas chromatograph was developed for the quantitative analysis of gas mixtures containing nitrogen dioxide at concentrations from 0.5 to 75 ppm in nitrogen, less than 250,000 ppm of oxygen, and up to 75 ppm of NO. The initial oxidation of NO for air oxidation studies was varied from 2 to 75 ppm while the oxygen concentration ranged from 30,000 to 250,000 ppm. The rate of reaction was measured in the ambient temperature range from 17 to 37 C and at a pressure of one atmosphere. The initial order of the oxidation reaction in the absence of NO₂ was 2.00 ± 0.09 for NO and 0.97 ± 0.11 for O₂. A third-order rate constant was obtained. The addition of NO₂ increased the initial oxidation rate. The initial third-order rate constant in the absence of NO₂ exhibited a small negative activation energy. A mechanism was proposed which involved six reactions with nitrogen trioxide, nitrous anhydride, and nitric anhydride as intermediates. The gas chromatograph developed for quantitative analysis was composed of a column with powdered Teflon, Fluoropak 80, and a parallel-plane electron-capture detector which, when operated in the pulse mode, was the most sensitive chromatography device available for the detection of NO₂. The absolute deviation was 3.4%, with a standard deviation of 1.3 ppm in the concentration range from 3 to 75 ppm of NO₂ when oxygen was present to the extent of 25% by volume in nitrogen. The detection limit for the method was 0.5 ppm of NO₂. The parameters influencing the sensitivity of the electron-capture detector were temperature, flow rate, cell geometry, size of tritium source, voltage, and the means of applying this potential to the cell.

1962

27730

APTIC NO. 49834

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Fachgruppe Staubtechnik

PARTICLE SIZE DETERMINATION IN TECHNICAL DUSTS. (Feinheitsbestimmungen an technischen Staeben). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, no. 2031:1-63, Oct. 1962, 154 refs.

Diverse methods for dust particle size determination are described. The specific method to be retained for a given dust sample should be determined as a function of the properties of the dust, the magnitude of the particle size spectrum, and the specific property (e.g., particle size, sedimentation rate, or specific surface) to be investigated in particular. The inherent limits of the available methods should also be considered. The particle size can be determined by microscopic and combined microscopic and gravimetric methods as well as by sieving. Sedimentation rates in air and liquids can be obtained by sifting, elutriation, and settling. Adsorption, permeability, entropy, and light scattering measurements constitute the basic means of determining the specific surface of dust particles. Formulae and charts for the conversion of different measured parameters are given.

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1973

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APTIC NO. 49987

Ministry of International Trade and Industry (Japan), Public Nuisance Security Bureau

ANALYSIS OF MEASURED SULFUR OXIDES DATA.

(*Two sankabutsu jissokuchi no kaiseki*). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 9(1):89-100, Jan. 1973.

Actual data of measurements of sulfur oxides for 1969-1971 at 94 cities were analyzed, and characteristics were developed of three groups, densely populated cities, old industrial cities, and new industrial cities. If the percentage figures of the annual average, hourly figures, and daily average get bigger, as they get closer to their maximums, there is wider discrepancy in their relationship with the annual average. This tendency is conspicuous when the figures exceed 95%, especially in the relationship between 100% figures (annual maximum) of hourly and daily averages, especially in the case of hourly averages. This means that the annual maximum pollution does not necessarily have the same trends as average pollution. For instance, even if there is stabilized degree of pollution on the average, there is quite a wide discrepancy in the maximum degree of pollution. The annual average of 0.05 ppm and the hourly 99% figure, 0.2 ppm, corresponded well. The annual average of 0.55 ppm and hourly 83%, 0.1 ppm, corresponded rather well. The annual 0.05 ppm average did not correspond with the daily average of 0.05 ppm, 70% figure, instead the annual average of 0.042 ppm (0.035-0.045 ppm) corresponded better with the daily 70% average, 0.05 ppm. Although there was discrepancy between the annual average, annual maximum, and average for January, if a coefficient must be sought, it was around 1.5 (if the annual average was 0.05 ppm, the average for January was 0.075 ppm). The same relationship between the daily average and the hourly figure (both annual and maximum) was that the annual maximum of the daily average, 0.1 ppm, corresponded to the hourly maximum in the year, 0.3 ppm. Hourly maximum in a year and daily average maximum in a year compared with the annual average were much greater in the case of new industrial cities than population dense cities, perhaps due to location of pollution sources, condition of operation, and meteorological conditions.

27732

APTIC NO. 49216

Haentzsch, Siegfried, Klaus Kaffanke, and Frank Nietruch

LEAD DETERMINATION IN STREET DUST BY MEANS OF ATOMIC ABSORPTION SPECTROPHOTOMETRY.

(*Bleibestimmung im Strassenstaub mittels Atomabsorptionsspektrophotometrie*). Text in German. Staub, Reinhaltung Luft, 33(1):33-36, Jan. 1973. 28 refs.

Atomic absorption spectrophotometry was used to determine the total lead concentration in downtown ambient air. Dust was precipitated on glass fiber filters. The sampled air volumes were on the order of magnitude of 100 cu m/hr. Filter materials were treated with nitric acid to dissolve the lead content. The standard deviation of the spectrophotometric measurement was stated by parallel determinations. It was about 0.03 mg Pb/l solution for concentrations between 0.5 and 3.5 mg Pb/l. The relative detection limit of the whole method was 1 microgram Pb/cu m when sampling for 1 hr, and 0.04 micrograms Pb/cu m when sampling for 24 hr. During measurements of ambient air quality in Berlin street tunnels, good correlations between lead content and carbon monoxide concentrations and traffic frequency were noticed. The maximum lead concentration was 25 micrograms/cu m for a mean value of 1 hr.

AIR POLLUTION ABSTRACTS, JUNE 1973

27733

APTIC NO. 49746

Kahl, H., P. Smolinka, and W. Prietsch

THE ATMOSPHERIC LEAD EMISSION IN THE CAPITAL OF THE GDR. (*Die atmosphärische Bleimission in der Hauptstadt der DDR*). Text in German. Technik (Berlin), 28(1):38-43, Jan. 1973. 25 refs.

Since April 1968 the atmospheric aerosol concentration has been measured at 10 stationary points in the city of East Berlin. In the first year the lead concentration of the dust was determined. On Nov. 1, 2, and 4, 1968 air samples were taken at five measuring stations between 8 am and 4 pm for lead analysis. The measurement stations were located around an industrial lead emission source. In addition the lead emission by automobiles was measured at two traffic intersections in a height of 0.7 m above the street level. These measurements were taken in the period from April 1970 to March 1971. The samples were taken in intervals of 2 hr between 6 am and 10 pm. The atmospheric lead background concentration for East Germany was 0.4 micrograms/cu m (arithmetic mean). The maximum allowable emission concentration of 0.7 micrograms/cu m was exceeded in 17% of all cases. The measurements around the industrial lead emission source yielded average values of the individual measurement days (as average of the five measuring points) between 2.0 and 2.7 micrograms/cu m. The average concentrations of the individual measuring points averaged over the three measuring days were between 1.7 and 3.0 micrograms/cu m. The diurnal average values of all five measuring points were above the long-term maximum allowable concentration. Correlation calculations between the lead concentration and the traffic density yielded a directly proportional relationship for both the individual type of automobile as well as for the sum of all automobiles. However, the agreement was not good, which was probably due to the dust agitation by the automobiles and the wind.

27734

APTIC NO. 49428

Philipp, Bertram, Alfred Achilles, and Norbert Trautmann

THE SUBJECT ENVIRONMENTAL PROTECTION IN A JOB-TRAINING SCHOOL. (*Das Thema Umweltschutz in einer berufsbildenden Schule*). Text in German. Staedtehygiene (Uelzen/Hamburg), 24(2):27-30, 1973.

In a job training school in Homburg/Saar, 34 students of various fields volunteered in a program aimed at measuring the air pollution in the downtown area of the city. A trace gas measuring unit with test tubes for carbon monoxide, oxides of nitrogen, sulfur dioxide, and hydrocarbons was available. The traffic density was counted with battery-operated counters developed for this purpose. The diurnal traffic density was determined by continuous traffic counts on the two market days between 7 am and 8 pm. The air pollution was measured hourly during this period. The measurements lasted from Dec. 1971 to June 1972. During the measurement period between 7 am and 8 pm about 16,000 automobiles passed the counting point. The traffic density reached a peak around 9 am with about 1300 automobiles per hour and one between 4 and 6 pm with about 2000 automobiles per hour. The minimum occurred during noon-time. The pollutant concentration in the air was not directly proportional to the traffic density. The concentrations were strongly influenced by the weather condition. The maximum CO concentration measured was 80 ppm, the highest concentration of the NOx was 1.1 ppm. For HC and SO2, only qualitative results were obtained. The pollution at dense traffic conditions was particularly high with cloudy weather, high relative humidity, and no wind. At the same traffic density the pollution was lower when westerly or easterly winds prevailed.

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1972

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APTIC NO. 49073

Shizuoka Municipal Government (Japan)

POLLUTION CONDITIONS IN SHIZUOKA CITY, 1971.

(Shizuoka-shi ni okeru kogai no gaikyo, Showa 46-nendo). Text in Japanese. 153p., Sept. 1972.

The total of pollution episodes increased from 102 in 1964 to 327 in 1971. In the latter case, 161 were air-pollution related. However, measurements of sulfur oxides concentration at five locations in Shizuoka showed a decreasing trend from 1970 to 1971. The particulate concentrations were higher compared to many other cities. The carbon monoxide concentrations measured at nine major intersections were lower than the environmental standard which stated that the average concentration for 8 consecutive hours should be below 20 ppm. The condition of air pollution in this city is considered moderate, but it is emphasized that continuous monitoring and enforcement of guidance are required.

27736

APTIC NO. 49118

Kagawa Prefecture (Japan)

THE RESULTS OF 1972 INVESTIGATIONS OF AIR POLLUTION AND WATER POLLUTION IN KAGAWA PREFECTURE. (Kagawa-ken) (Showa 47-nendo taiki osen, Suishitsu odaku chosa kekka). Text in Japanese. 59p., Dec. 1972.

Measurements were conducted for sulfur oxides concentrations at seven locations by the electric conductivity method and 45 locations by the lead dioxide method; for particulate concentrations at 18 locations by deposit gauges; and for fluorides concentrations at five locations. The sulfur oxides concentrations measured by the PbO₂ method were classified into five degrees from under 1.0 mg/100 cu m/day as slight pollution to over mg/100 cu m/day as severe pollution. The SO_x concentrations measured by the conductivity method were all below the environmental standards. Among the 45 locations at which SO_x concentrations were measured by the PbO₂ method, only three locations had SO_x concentrations slightly over 1.0 mg/100 cu m/day. Only one location had a particulate concentration over 10 tons/sq km mo. The hydrogen fluoride concentrations were also below the threshold values which would cause damage to plants.

27737

APTIC NO. 49120

Tokyo Metropolitan Government (Japan) Bureau of Environmental Protection

THE RESULTS OF A COOPERATIVE INVESTIGATION OF THE TOKYO METROPOLITAN GOVERNMENT, WARD OFFICES, AND THE MUNICIPAL OFFICES ON CARBON MONOXIDE CONDITIONS. (To-ku-shi kyodo issanka tanso jittai chosa kekka ni tsuite). Text in Japanese. 11p., Aug. 1972.

Measurements were conducted at 107 intersections of high traffic amount or high carbon monoxide concentrations due to the ground shape on clear days with a wind velocity below 4.5 m/sec. The average concentrations for 10 consecutive hours were found over 10 ppm at 23 intersections and over 20 ppm at one intersection. Results also showed that the pollution concentration was higher in the center area; eight of the 14 intersections in Chiyoda ward had an average concentration over 10 ppm. Areas around the intersections had shown high CO concentrations. Six intersections with a traffic amount of less than 3000/hr had CO concentration over 10 ppm. In the future, 34 intersections will be subjected to continuous monitoring.

27738

APTIC NO. 49318

Kyoto Prefectural Government (Japan). Dept. of Hygiene

THE PRESENT CONDITION OF PUBLIC NUISANCE IN KYOTO PREFECTURE AND THE COUNTERMEASURES-1971. (Kyoto-fu ni okeru kogai no genkyo to

taisaku. Showa 46-nendo). Text in Japanese. 347p., Dec. 1972.

The population in Kyoto Prefecture in Oct. 1970 was 2.25 million, a density of 488/sq km. There were 31,664 manufacturers in this area. In 1970, four out of 14 major locations in the area showed higher sulfur oxides concentration, measured by the conductivity method, than the environmental standard. The overall SO_x concentration in 1971 decreased, with only one major location with higher concentrations than the environmental standard. Measurement of carbon monoxide concentrations at major intersections at Kyoto city showed that the average concentration increased from 5.6 ppm in Dec. 1969 to 6.1 ppm in Feb. 1971. Countermeasures on photochemical smog formation were enforced by improving automobile exhaust system, revising emission standards, and continuous monitoring.

27739

APTIC NO. 49612

Kanagawa Prefecture (Japan), Public Nuisance Center

AIR POLLUTION IN THE KEIHIN INDUSTRIAL DISTRICT (2). (Keihin kogyochitai no taikiosen (2)). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:46-54, Feb. 1972.

Sulfur oxides were continuously measured at 12 points in Kanagawa Prefecture in the Keihin industrial district consisting of Yokohama and Kawasaki from Jan. to Dec. 1970. Sulfur oxide concentrations were compared with environmental standards specifying five criteria. The first criterion is that the number of hours with a 1-hour value of 0.2 ppm or lower should be 99% of the total hours throughout the year. The second is that the number of days with 1-hour value averages of 0.50 ppm or lower should be 70% of the total days of the year. The third is that the numbers of hours with 1-hour values of 0.1 ppm or less should account for 88% or more of the year. The fourth is that the annual average of 1-hour values should not exceed 0.05 ppm. The fifth is that the number of days requiring emergency measures specified in the Air Pollution Control Law should not exceed 3% of the total number of days of the year and should not last more than three consecutive days. Half of the 12 points satisfied all criteria. The meteorological conditions of alert days were analyzed to find their relationship with sulfur oxides.

27740

APTIC NO. 49613

Yokohama Municipal Office (Japan), Public Nuisance Control Center and Kawasaki Municipal Office (Japan), Pollution Control Bureau

SURVEY ON THE ACTUAL STATE OF AIR POLLUTION: AIR POLLUTION IN THE KEIHIN INDUSTRIAL DISTRICT (1). (Taikiosen no jittai chosa: Keihin kogyochitai no taikiosen (1)). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:5-20, Feb. 1972.

Air pollution was measured during 1970 in the Keihin district consisting of Yokohama and Kawasaki in Kanagawa Prefecture. Precipitating dust was measured at 16 locations in Yokohama and eight in Kawasaki. Total quantity and soluble and insoluble components were tabulated in terms of t/sq km/mo. The total quantity in the industrial zone was 15.2 t/sq km/mo for 1970, indicating a decrease from 15.7 in 1969 and from 21.9 in 1959. Sulfur oxides were measured at 32 points in Yokohama and 12 in Kawasaki. The 1970 SO_x values by the lead dioxide method were 1.58 mg sulfur trioxide/day/100 sq cm for the industrial zone, 1.03 for the semi-industrial, 0.70 for the commercial/residential, and 0.32 for the agricultural or suburban in Yokohama; they were 2.24, 1.81, 0.83, and 0.04, respectively, in 1966. Sulfur oxides have been generally decreasing in both Yokohama and Kawasaki.

27741

APTIC NO. 49307

Abdoh, Y., N. Aghdaie, M. R. Darvich, and M. H. Khorgami
DETECTION OF SOME POLYNUCLEAR AROMATIC
HYDROCARBONS AND DETERMINATION OF
BENZO(A)PYRENE IN TEHERAN ATMOSPHERE. *Atmos. Environ.*, 6(12):949-952, 1972. 7 refs.

The presence of some polynuclear aromatic hydrocarbons such as benzo(a)pyrene, perylene, benzo(e)pyrene, benzo(a)anthracene, pyrene, phenanthrene, and coronene in the atmosphere of Teheran, Iran, was established by a combination of thin-layer chromatography and the fluorometric method. Sampling was done through a glass fiber filter by a high volume air sampler. The benzene-soluble fraction was extracted with benzene in a Soxhlet extractor. Two-step chromatography was used with n-hexane-ether in a ratio of 19:1 as a solvent and alumina as an absorbent in the first step, and with acetylated cellulose as an absorbent and ethanol-toluene-water in a ratio of 17:4:4 as a solvent. Fluorescence spectra at an activating wavelength of 365 micron in n-pentane were applied for identification, and the narrow base line method was used for determination of benzo(a)pyrene. The concentration of benzo(a)pyrene was measured in July and Nov. 1971. The respective concentration ranges obtained for the 2 months were 0.57-0.65 and 4.90-7.51 micrograms/1000 cu m of air. The elevated benzo(a)pyrene levels measured in November were probably due to meteorological effects.

27742

APTIC NO. 49416

Bourbon, P., J. Alary, J. Esclassan, and F. Alengrin

NITROGEN OXIDE DETERMINATION IN URBAN AIR
SAMPLES. (*Determination des oxydes d'azote en at-*
mosphère urbaine). Text in French. *Pollut. Atmos. (Paris)*,
14(56):363-366, Oct.-Dec. 1972. 4 refs.

Results of nitric oxide and nitrogen dioxide determinations at five sampling stations in Toulouse during the June-July, 1970, period, as well as the measurement method applied are described. Sampling over 24-hour periods was done by means of a bubbler containing sulfanilic acid, acetic acid, N-naphthylethylenediamine dichlorohydrate, and acetone in distilled water. The sampling rate was 40-60 l/hr. The NO₂ recovery rate was 90%. Spectrophotometric determination in a curvette at 550 nanom was applied with a sensitivity of 1.5 micrograms/cu m and an accuracy of 3%. The nitrogen oxide concentrations measured during the 9 am to 9 am, 9 am to 6 pm, and 6 pm to 9 am periods were in the respective ranges of 27-140, 25-160, and 30-90 micrograms/cu m. The values obtained for the 9 am to 6 am measurement period were about twice those obtained for the 6 pm to 9 am period. The maximum in the 7 am to 9 am and 6 pm to 8 pm periods, and the daytime minimum in the 3 pm to 6 pm period were measured. Correlations between nitrogen oxide concentrations and traffic density, atmospheric stability, and topography were established. The dilution factors determined for NO and NO₂ at 0.4 and 1.2 m from the tailpipe of a car were above 50 and 100, respectively.

27743

APTIC NO. 49722

Bramson, P. E. and J. P. Corley

AIR QUALITY DATA. In *Environmental Surveillance at Hanford for CY-1971*. Battelle Memorial Inst. Richland, Washington, Pacific Northwest Labs., p. 25, 27, 47, 48, B.3, C.3, Aug. 1972. 20 refs.

NTIS: BNW1-1683

Air quality data and nitrogen dioxide, sulfur dioxide, and suspended particulate concentrations are reported for Richmond, Washington and the surrounding area. Analytical procedures included: collection with alkaline solution bubbler, colorimetric determination as azo dye, using a sulfanilamide method for nitrogen dioxide; collection with a bubbler solution of sodium tetrachloromercurate, with colorimetric determination for sulfur dioxide, and collection on a glass fiber filter,

with direct weighing for particulate loading for suspended particulates. Average concentrations at the measuring stations, and air quality standards are provided.

27744

APTIC NO. 49505

Daessler, H. -G. and G. Stein

SO₂ MEASUREMENT GRID IN THE MOUNTAIN
RANGES ERZ- AND ELBSANDSTEINGEBIRGE -
FIVE YEAR SURVEY 1966/71. (*SO₂-Dauermessnetz im*
Erz- und Elbsandsteingebirge - 5-Jahresuebersicht 1966/71).
Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete (Berlin)*,
18(12):946-948, 1972. 1 ref.

Sulfur dioxide was measured at 6 am, noon, 6 pm, and over the entire 24-hour period in the Erz and Elbsandsteingebirge mountain ranges from Oct. 1966 to Sept. 1971. The short term measurements numbered 9391, and the diurnal average values number 9300. The sum average of the short term values was 0.07-0.18 mg/cu m air of SO₂. Higher concentrations occurred over the winter, due to domestic heating. The sum frequency of concentrations above 0.15 and 0.50 g SO₂/cu m of air is given. Of the short-term measurements, between 0.7 and 0.9% were above 1.0 mg SO₂/cu m, and of the long-term data, 2.1% were higher than 1.0 mg SO₂/cu m air.

27745

APTIC NO. 49206

Duuren, H. van and A. J. Elshout

SULFUR DIOXIDE MEASUREMENTS IN COMBINED
ELECTRIC POWER GENERATING PLANT AREAS.
(*Het SO₂-meetnet van de samenwerkende elektriciteits-*
produktiebedrijven). Text in Dutch. *Elektrotechniek*,
50(24):985-990, Nov. 23, 1972. 6 refs.

Results of sulfur dioxide measurements performed in the Oct. 1, 1969 through Sept. 30, 1970 and Oct. 1, 1970 through Sept. 30, 1971 periods at 16 different sampling stations in combined power plant areas throughout the Netherlands are presented. Sampling was done over 24-hour periods at a rate of about 1 l/min by means of bubbler containing tetrachloromercurate. Photometric determination by means of Scaringelli's pararosaniline method was adopted. The 50% and 98%-values of the cumulative frequencies during the two different periods were in the respective ranges 4-54 and 93-220, as well as 5-56 and 50-260 micrograms/cu m. The SO₂ concentrations were higher by a factor of two to three in center city than in peripheral areas. Influence of the domestic heating and wind direction on the measured SO₂ concentrations was observed.

27746

APTIC NO. 49402

Emoto, A., M. Saito, M. Araki, M. Muramatsu, K. Tsuji, and Y. Suzuki

A STUDY ON INDOOR AIR POLLUTION BY METAL
COMPOUNDS (1ST REPORT). (*Shitsunai kukichu no*
fuyu funjin ni kansuru kenkyu Dai Ippo). Text in
Japanese. *Nippon Koshu Eisei Zasshi (Japan J Public*
Health), 19(10):429, Oct. 1972. (Presented at the Japan
Society of Public Health, General Meeting, 31st, Sapporo,
Japan, Oct. 25-27, 1972.)

Three adjacent buildings in Tokyo were tested for natural ventilation and central air conditioning system. Floating dust was collected in the daytime and at night. The weight and amount of the dust were measured, and hydrochloric acid was calculated after ashing the dust. The quantities of calcium, magnesium, zinc, iron, and manganese were measured by the direct method, and lead, cadmium, cobalt, nickel, and copper were measured by atomic absorption and DDTIC MIBK. The quantity of floating fine dust was less inside than outside the buildings. Buildings utilizing an air control equipment during the day contained about 1/2 the quantity of particulates as the outside. Even natural ventilating buildings whose windows are closed had about 2/3 the particulates. The main substance in floating dust at night was Fe (30%) and in the day Zn (75%). The quantity of floating dust inside the department store was

AIR QUALITY MEASUREMENTS

27752

low, but the holding rate of metals reached 28%; most of it was Zn. The concentration of Cd and Co was more or less same as that outside, and that of Mn, Pb, Ni, and Cu was less than outside. In the case of buildings with natural ventilation and with closed doors, direct influence by exterior air was also low.

27747 APTIC NO. 49552

Fujii, Toru, Nobuko Tajima, Yoshinari Kurozaka, Kenichi Yoshimura, Kaori Inoue, Keisuke Taguchi, Fujihiko Go, Kenji Oka, Yoshimori Nishikawa, Hiroshi Hatanaka, and Yoshio Tsujino

MONITORING THE ATMOSPHERIC DUST FALL AND SULFUR DIOXIDE BY LEAD CANDLE IN OSAKA PREFECTURE. (*Kokubaijin narabini misanka namariho ni yoru arisan gasu no sokuteri kekka*). Text in Japanese. Osaka-fu Kogai Kanshi Sentia Chosa Shitsu Kenkyu Hokoku (Proc. Res. Sect. Osaka Environ. Pollution Control Center), no. 3:59-61, Dec. 1972. 3 refs.

In 1971 dust fall in Osaka was measured gravimetrically and sulfur dioxide was measured by the lead dioxide method. Dust fall is gradually decreasing -- a 8-28.8% reduction occurred from 1970 to 1971 in 19 of 20 measuring places. Sulfur dioxide also decreased from 1969 to 1971. The reduction of pollutants is due to the Osaka city control plan which promoted lowering the sulfur content in petroleum and limiting the use of heavy oil and to weather conditions.

27748 APTIC NO. 49572

Fujii, Toru, Hiroshi Kitayama, Toshihiro Akashi, and Yoshio Iwata

STUDIES ON THE LOCAL AIR POLLUTION. (2) AIR POLLUTION IN THE SOUTH AREA OF TOYONAKA CITY OSAKA PREFECTURE (REPORT 1). (*Gien kyokusei taikosen ni kansuru kenkyu*). (2) Osaka-fu toyonakashi nanbu chiku ni okeru taikosen (Dai ippon). Text in Japanese. Osaka-fu Kogai Kanshi Sentia Chosa Shitsu Kenkyu Hokoku (Proc. Sect. Osaka Environ. Pollution Control Center), no. 3:11-20, Dec. 1972. 4 refs.

In 1970 the rate of development of chronic bronchitis symptoms in the south part of Toyonaka city was 5.8% for A school area and 13.5% for B school area. Air pollution was measured from Dec. 1971 to March 1972. Suspended particulates were collected by a high volume air sampler for 24 hour periods once a week, chemical composition (metals) and dust weight were determined by spectrophotometry, sulfuric acid mists were determined by the Scaringelli method. Sulfur oxide pollution was high in the south part of Toyonaka. Peak SO₂ concentrations were between 9 and 10 ppb. Concentrations of more than 0.2 ppm occurred between 11 am and 6 pm. High SO₂ concentrations occurred when 2.5 m wind speeds from the south occurred. The dust weight 10,300 micrograms/cm³. A high level of vanadium was detected. The amount of sulfuric acid mists was similar to that in Osaka.

27749 APTIC NO. 49394

Fukuoka, Saburo, Mitsuru Udagawa, Masanao Funashima, and Toshio Ohira

STUDY ON CONTINUOUS SURVEY RESULTS OF CARBON MONOXIDE AT ONE MAJOR INTERSECTION, HONN. (*Kosuden shihen issankutai o jitu chosa kekka no kosatsu*). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 3:47-56, March 1972. 8 refs.

Carbon monoxide from automobiles was measured at five major intersections in Tokyo from autumn 1970 to March 1971. The CO concentrations were constantly high and often over 10 ppm in monthly average where traffic is heavy or where topographic conditions were unfavorable. Depending on meteorological conditions, CO sometimes exceeded 30 ppm. High CO concentrations (10 ppm or higher) occurred

during over 50% of the measurements at most intersections. The CO concentration decreased to 1/2 in the area 50 m or more away from the intersection. Hourly changes of CO showed a two peak curve in winter; the first peak was at 1800-1900 hours, and the larger peak was recorded 2-3 hours after sunset. The CO and nitric oxide correlations were high near the road, but poor away from the road due to conversion of NO to nitrogen dioxide. The CO concentration could be correlated with wind.

27750 APTIC NO. 49392

Funashima, Masanao, Saburo Fukuoka, and Toshio Ohira

STUDIES ON POLLUTION BY SUSPENDED PARTICULATES. (*Fuyu buyushi osen ni tsuiteno nisan no kosatsu*). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 3:40-46, March 1972. 5 refs.

Suspended dust and visibility 24 hour data from Tokyo during Dec. 1970 and Jan.-Feb. 1971 was correlated and analyzed by month. Suspended dust correlated significantly with visibility (coefficient from 0.42 to 0.63). Humidity also affected visibility. The ratio of dust concentration to humidity in terms of their effect on visibility was 3 to 7 in warm seasons and 2 to 8 in cold seasons. The relationship between sulfur dioxide and dust was higher during the daytime and lower at night, while the relationship between humidity and dust was the opposite. There was a high degree of composite correlation between dust and SO₂/humidity.

27751 APTIC NO. 49415

Gvamchava, A. R., P. P. Dikun, N. D. Krasnitskaya, N. G. Turkiya, P. N. Krasnyanskaya, and G. I. Chechelobvili

A STUDY OF 3,4-BENZOPYRENE CONTENT OF THE ATMOSPHERE OVER TBILISI. (*dzuchemye soderzhaniya 3,4-benzopirena v atmosfere vozdukh goroda Tbilisi*). Text in Russian. Soobshchi. Akad. Nauk Gruz. SSR, 68(2):489-492, 1972. 8 refs.

Results of 3,4-benzopyrene concentration measurements in the atmosphere of Tbilisi, USSR, are presented. The measurements were performed by sedimentation and dust techniques. The 3,4-benzopyrene concentrations in dust samples ranged from 0.03 to 0.11 micrograms dust, as compared to a control value of 0.01 micrograms. A maximum of 40 micrograms/m³ in a residential district with no central heating was measured by sedimentation technique. The 3,4-benzopyrene concentrations were highest in winter and near busy highways.

27752 APTIC NO. 49383

Hanning, K. and W. Radt

AIR POLLUTION STUDIES IN THE BEZIRK HALLE. EMISSION MEASUREMENTS IN THE INDUSTRIAL AREA HALLE-MERSEBURG. (*Lufthygienische Untersuchungen im Bezirk Halle. Immissionsmessungen im Industriegebiet Halle-Merseburg*). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 180(1945-94): 1972. 8 refs.

Random samples were taken at 60 measuring points in the industrial area of Halle-Merseburg to determine the spatial distribution of sulfur dioxide, nitrogen dioxide, hydrogen sulfide, ammonia, phenols, and chlorine. The arithmetic means and emission parameters for short-term pollution concentrations (IK) and for long-term concentrations (ID) were calculated. The maximum allowable concentrations were exceeded by SO₂ (ID 0.07-0.17 mg/cm³, IK 0.10-0.67 mg/cm³), H₂S (ID 0.00-0.09 mg/cm³, IK 0.00-0.10 mg/cm³), and phenol (ID 0.00-0.005 mg/cm³, IK 0.00-0.17 mg/cm³).

27753

APTIC NO. 49525

Hara, Masamichi, Saburo Hayashi, Eiji Yamashita, and Keiichi Hirai

STUDY ON COMPLEX AIR POLLUTANTS (I): INVESTIGATION OF OXIDANTS AND ADDITIONAL FACTORS IN AMAGASAKI. (*Taiki fukugo osen busshitsu ni kansuru kenkyu (I): Amagasaki shi ni okeru okishidanto kanren busshitsu chosa*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 301. (Nov. 7-9, Paper 248.)

At five locations in Amagasaki, oxidants, nitric oxide, nitrogen dioxide, sulfur dioxide, carbon monoxide, wind direction, wind speed, temperature, and humidity were measured between August and October 1971; the oxidant characteristics of each location were analyzed. Oxidant was analyzed by the alkaline potassium iodide method, NO and NO₂ by the Jacobs method, SO₂ by the pararosaniline method, and CO by the non-dispersion infrared spectrometry. The oxidant fluctuation ranged from 20 to 63 ppb, and the daily average at each location ranged from 15 to 45 ppb. When the wind was 2-3 m/sec and easterly, at all locations except for the northern point, the oxidant concentration peaks appeared between 1 and 2 pm. The relationships between oxidants and NO, NO₂, and CO were not clear from the data obtained, and further research is required.

27754

APTIC NO. 49526

Hayakawa, Kazuya, Takeshi Kubo, Masaharu Kaneshima, and Tadashi Morita

AIR POLLUTION BY STACK EFFLUENTS IN THE SHINJUKU AREA. (*Shinjuku-ku nai kotei hassei gen ni yoru taiki osen*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 174. (Nov. 7-9, Paper 129.)

Pollution measurements were taken in various parts of Shinjuku ward, of Tokyo and the correlations between areas and measurement apparatus characteristics were analyzed. The areas examined were a commercial area with the business entrance to the Shinjuku Station, a presently vacant business section, and a residential section. There was no correlation between any two of these locations, which are only 1-2 km apart from each other. Even with the corrections made from the areal characteristics and the apparatus characteristics, the pollution concentration of the active business area was almost three times over the other two areas. The corrected measurements showed great differences depending on what factors were taken into consideration for correction. However, the results showed clearly that even in congested areas of a city, under the appropriate city planning, local air pollution condition could be controlled by good management and control of heating and cooling systems.

27755

APTIC NO. 49520

Hirose, Kazutoyo, Yoji Sano, Chiharu Sano, and Katsuhiko Koizumi

INVESTIGATION OF THE ATMOSPHERIC POLLUTION IN SAITAMA PREFECTURE, NO.2: DISTRIBUTION OF SULFUR OXIDES AND NITROGEN OXIDES IN SAITAMA PREFECTURE. (*Saitama-ken ni okeru taiki osen no chosa kenkyu dainiho SOx to NOx no bunpu*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 178. (Nov. 7-9, Paper 133.)

Air pollutant samples were taken from 635 public schools in Saitama Prefecture. These schools comprised 65.7% of the total 966 public schools in the 4300 mesh (standard 1 sq km mesh) in the Prefecture. Using the alkaline filter method, the distribution concentration of sulfur oxides and nitrogen oxides were measured. Of the total samplings, 481, or 78.9% were free of direct influences from emission sources such as stacks, and 53.8% were free of special concentration effects such as

wind and buildings. The ratio of the types of environment was agricultural, 47.7% residential; 36.1%; and commercial and industrial areas, 2.6% each. The maximum SO_x was 2.74 mg/100 sq cm/day; minimum was 0.101 mg/100 sq cm/day; the average was 0.385 mg. The NO_x maximum was 0.697; minimum, 0.004; and average 0.054 mg/100 sq cm/day. Histograms are presented. This survey was conducted in order to develop a method for the survey of a large area pollution condition and for feeding back the data for city planning and public health programs.

27756

APTIC NO. 49246

Hosokawa, Yoshioki, Shiro Izumi, and Kozo Suzuki

RESEARCH ON ACTUAL CONDITIONS OF PUBLIC NUISANCE AND ITS CONTROL IN AOMORI PREFECTURE (REPORT 4): YATSUDO CITY. (*Yatsudo chiiki ni okeru taiki osen no keinen henka to taisaku ni kansuru kosatsu-Aomori-ken ni okeru kogai no jittai to taisaku ni kansuru chosa kenkyu (Daiyonpo)*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 183. (Nov. 7-9, Paper 138.)

The transition of industries in Yatsudo city: the transition of oil and coal consumption, yearly fluctuation of settling particle counts, fluctuations of sulfur oxides counts are presented in tables for 1965-1971, and the 1971 measurements of sulfur trioxide by an automatic recorder are shown in a table. The maximum settling particles concentration stayed between 28.4 t/sq km/mo and 364 t/sq km/mo between 1965 and 1970, but increased to 50.6 tons in 1971. Averages for these years were between 7.0 in 1965 and 11.4 in 1967, and this also increased to 12.6 tons in 1971. The SO₃ maximum ranged 2.17 mg/day 100 sq cm (lead dioxide method) in 1965 and 1.26 mg in 1966. The 1971 count was the highest of them all at 2.66 mg. Averages ranged between 0.32 mg in 1965 and 0.50 in 1970; the 1971 average was 0.39 mg. At all of six monitoring points, the 1971 measurements of sulfur oxides were below the environmental standard of 0.05 ppm, ranging between 0.04 (industrial area) and 0.009 (residential area).

27757

APTIC NO. 49550

Inoue, Kaori

STUDY OF LIGHT HYDROCARBONS IN URBAN ATMOSPHERES (2). (*Toshitaikichu no teifutten tankaisuo ni kansuru kenkyu (2)*). Text in Japanese. Osaka-fu Kogai Kanshi Senta Chosa-Shitsu Kenkyu Hokoku (Proc. Res. Sect. Osaka Environ. Pollution Control Center), no. 3:45-49, Dec. 1972, 2 refs.

The relationship between carbon monoxide and light hydrocarbons was investigated at three spots in Osaka. There was no difference between i-pentane, n-pentane, 2-metapentane, 3-metapentane, and n-hexane by regional groups, but there was a difference in acetylene, propane, and n-butane. There was little regional difference with acetylene, but propane and n-butane showed clear regional differences, suggesting that the differences in the number of cars using liquefied petroleum gas as a fuel. The liquefied petroleum gas exhausts contain a large amount of imperfectly burned fuel components. The higher the number of running taxis, the greater the ratio of exhausted butane and propane to that of carbon monoxide, which results in a regional difference.

27758

APTIC NO. 49371

Kitagawa, Yoshio, Akira Fukukawa, Tatsuo Maeda, Hiroshi Ryumi, and Masatoshi Ito

INVESTIGATION OF SUSPENDED ATMOSPHERIC POLLUTANTS IN SEVERAL CITIES IN YAMAGUCHI PREFECTURE (I). (*Yamaguchi-ken shotoshi ni okeru fuyu funjin ni kansuru kenkyu (daiippo)*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 248. (Nov. 7-9, Paper 202.)

The air quality, especially the metal components in suspended particulates, was measured in various cities in Yamaguchi Prefecture. Measurements were taken at 17 locations in Ube, Onoda, Iwakuni, Wagi, and Yamaguchi, over a 4-day period each in Sept., Oct. 1971 and Feb. 1972. Hi-vol samplers were used with glass fiber filter papers for 24 hr. The Soxhlet's extractor was used for analyzing organic matter; the barium nephelometer was used for sulfides; 2,4-dinitrophenol colorimetry was used for the nitrate ion; the thiocyanic acid secondary mercury method was used for chlorine ion; and atomic absorption spectrophotometry was used for metals. Of the five cities, Ube, which has the largest number and scale of industries, had the highest measurements in all but cadmium, total dusts, NO_3 , Cl, sulfate, calcium, manganese, iron, magnesium, lead, nickel, chromium, and cobalt. In the adjacent city Onoda, most measurements were second to Ube. The pollution conditions were similar in these cities because the industrial conditions were similar, but the scale is smaller in Onoda. In Iwakuni and Wagi, which are next to each other, the pollution characteristics were approximately similar. Although Iwakuni and Wagi embrace larger scale industries in some areas, the measurements of most elements were lower than Ube-Onoda. That is because the latter is largely ceramic, fertilizer, metal fabricating industries, whereas the former concentrates in petroleum chemical industries. The commercial town Yamaguchi had relatively low metal pollution but rather high indexes of lead and NO_3 , because of heavy traffic and limited dispersion of pollutants due to topography.

27759 APTIC NO. 49332

Koike, Shigeyuki, Masayoshi Inoue, Akihiro Sakamoto, Takeshi Katsuyama, Shuhei Kamihira, and Kenji Arimoto

REPORTS ON THE MEASUREMENTS OF SUSPENDED PARTICULATES (NO. 1). (*Fuyu funjin no sokutei kekka ni tsuite (daiippo)*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 249. (Nov. 7-9, Paper 203.)

The mutual relationships among dusts, their monthly fluctuations, the water solubles in suspended particulates, particle size distributions, and visibility were studied in Wakayama. Hi-vol samplers with separators were used to take 24-hour samples, and a continuous measurements for a month were taken with the low-vol samplers. Sulfides, nitrates and lead ions were high around June when the humidity was high. Chlorine ions and ammonia ions were low in the summer and higher in winter. The ratio of water solubles in suspended particulates was approximately 30-45% and was high in June when humidity was high. From the geographical condition, the sea water factor seemed to contribute to the humidity and visibility. The visibility and sulfate ions showed a good relation throughout summer and winter, according to the hi-vol samplings. More than 70% of sulfates were less than 1 micron in size. These hygroscopic particles absorb water in the air and increase the scattering index and lower the visibility. The measurements of dusts, lead, sulfate, nitrate, chloride, and ammonium are presented in tables.

27760 APTIC NO. 49513

Koike, Shigeyuki, Masayoshi Inoue, Akihiro Sakamoto, Takeshi Katsuyama, and Shuhei Kamihira

REPORTS ON THE MEASUREMENTS OF SUSPENDED PARTICULATES (NO. 2). (*Fuyu funjin no sokutei kekka ni tsuite (daiinibo)*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th 1972, p. 250. (Nov. 7-9, Paper 204.)

The characteristics of pollution in Wakayama city were investigated between Dec. 1971 and Jan. 1972 for the purposes of comparison with other cities. Air quality measurements were taken in four areas of agricultural, residential, chemical industry, and ironwork industry by hi-vol samplers. Dusts, metal components, and water soluble components were measured. For metals, a quarter of the filter paper was extracted by chlorine and atomic absorption spectrophotometry was ap-

plied. Water solubles were extracted from 1/8 of the filter paper, and sulfides were extracted by nephelometry; nitrates were analyzed by the 2,4-dinitrophenol method; chloride was analyzed by the Rhodan mercury method, and ammonium was analyzed by Nessler's method. The amounts of iron, zinc, and manganese in the residential and chemical industry areas were two or three times over the amounts in the agricultural area; but in the ironwork area, iron was 10 times, and Zn and Mn were five times above the agricultural area. Lead and cadmium solubles were two to three times higher in all three areas. Sulfates were also measured. Measurements are presented in tables.

27761 APTIC NO. 49143

Kono, Kinji, Teruhiko Wada, and Koreharu Uchima

A SURVEY OF SUSPENDED EUMYCETES IN AIR POLLUTED DISTRICTS. (*Taiki osen chuki ni okeru fuyu shinkin ni kansuru chosa, sono 2*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 182. (Nov. 7-9, Paper 137.)

After investigations from March 1969 to Feb. 1970 in three areas (industrial, commercial, and residential) of Kawasaki city on suspended bacteria (*aspergillus*, *candida*, *cladosporium*, *penicillium*, and *alternaria*), a large number of *candida* were found in the industrial area. From Oct. 1970 to Sept. 1971, similar investigations on eumycetes were conducted in three sections of industrial area. Natural settling of bacteria was used for sampling, and five cultures were left at 1 m above the ground for 20 min. Sulfur dioxide concentration, wind direction, wind velocity, and temperature were examined in each case. After 96 hours of culture, colonies were visually examined, and eumycetes were transplanted on an incline and cultivated for 6 days. After spores were formed, they were examined and compared with the standard bacteria. Potato glucose agar cultures were used. *Candida* were especially numerous in one area where the SO_2 concentration was extremely high. Throughout the year, there were no seasonal fluctuations. Also, there were no geographical differences for other types of eumycetes. The relationship between *candida* and SO_2 will be studied in the future.

27762 APTIC NO. 49449

Lee, Robert E., Jr., Kathy Harris, and Gerald Akland

RELATIONSHIP BETWEEN VIABLE BACTERIA AND AIR POLLUTANTS IN AN URBAN ATMOSPHERE. Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 17p. 1972. 20 refs.

The relationship between viable bacteria concentration and size and concentrations of selected air pollutants and various meteorological parameters was examined based on air quality measurements in Cincinnati. Significant correlations were determined between the concentration of viable airborne bacteria and the concentration of carbon monoxide (+0.61) and hydrocarbons (+0.51). No statistically significant correlations were determined between bacteria concentration and temperature, relative humidity, or the concentrations of total suspended particulate matter, nitrogen dioxide, nitric oxide, sulfur dioxide, and oxidants. Partial correlation analysis where temperature and humidity were held constant, however, revealed significant correlations between bacteria concentration and the concentrations of NO (+0.45), NO_2 (+0.62), SO_2 (+0.76), hydrocarbons (+0.57), and CO (+0.54). Bacterial size expressed as the mass median diameter (7.6 micron average) was significantly correlated with relative humidity (-0.71) and CO concentration (+0.60). (Author abstract modified)

27763 APTIC NO. 49995

Mitani Kazumori, M. Hoshino, H. Tsuchiya, K. Itaya, M. Kondo, and M. Ogawa

RESEARCH ON THE INFLUENCE OF AIR POLLUTANTS ON INDOOR ENVIRONMENTS. (I). NON

METALLIC COMPONENTS IN DUST DEPOSITS ON AIR FILTERS OF A CITY BUSINESS BUILDING. (Taikiosen busshitsu no shitsunai kankyo ni oyobosu eikyo ni kansuru kenkyu. Dai ippo. Toshi bo-biru no eyafiruta ni fuchaku shita funjin no hikinzo seibun ni tsuite). Text in Japanese. Nagoya-shi Eisei Kenkyushoho (Ann. Rept. Nagoya City Health Res. Inst.), no. 18:81-86, Oct. 1972. 21 refs.

A quantitative chemical analysis was performed to determine nitrate, nitrite, chloride, sulfate, and tar included in dust deposits sampled from air filters installed in ventilation inlets of the second, seventh, and ninth floors of a nine storey commercial building in the business center of Nagoya, Japan. The sampling was conducted each month for one year, starting on Oct. 1, 1970 until May 15, 1971, by removing dusts accumulated in each month in air filters at three places of the building under survey. Ground height, direction, wind velocity through ventilation inlets, and inlet areas of ventilators on each floor of the building were noted. The annual average concentration of NO₂(-) was 23.1 ppm on the second floor, 21.7 ppm on the seventh floor and 18.3 ppm on the ninth floor. Thus, mean concentration of nitrite decreased with elevation. Higher concentrations occurred in winter than in summer. This attributed mostly to oxidants in the summer which oxidize nitrites to nitrates. The annual average concentration of nitrate was 2.483 ppm on the second floor, 2.827 ppm on the seventh floor and 2.621 ppm on the ninth floor. There was no significant correlation between nitrate and nitrite. The annual mean value for all floors for Cl(-) was approximately 16,000 ppm. The annual average concentration of sulfate was 24,010 ppm on the second floor, 19,110 ppm on the seventh floor, and 16,880 ppm on the ninth floor. The annual mean value of tar on each floor showed a very slight decrease with a height increase. The mean value for all floors was 5.178 ppm/yr. The non-metallic content of pollutants in the winter per floor was 4.07-4.17%. Chemical analysis of sulfur dioxide, carbon monoxide, carbon dioxide, and nitrogen dioxide conducted simultaneously indoors and outdoors to survey ventilation effects of air filters installed in a different building revealed that SO₂ was apparently removed, but other pollutants were not, probably due to cigarette smoke emitted indoors.

27764

APTIC NO. 49181

Mrose, H.

GAS CHROMATOGRAPHIC DETERMINATION OF THE C₁, C₂, AND C₃ HYDROCARBONS IN ATMOSPHERIC AIR AT THE METEOROLOGICAL OBSERVATORY WAHNSDORF NEAR DRESDEN. (Gaschromatographische Bestimmung der C₁, C₂, und C₃-Kohlenwasserstoffe in atmosphärischer Luft am Meteorologischen Observatorium Wahnendorf bei Dresden). Text in German. Z. Meteorol., 23(3/4):112-116, 1972. 7 refs.

Sixty-seven measurements of methane and 312 measurements of C₂- and C₃ hydrocarbons were made by gas chromatography at the Meteorological Observatory in Wahnendorf from 1966 to 1968. The methane concentration varies by about 1.5 ppm and has no correlation with the time of day, season, air pollution concentration, or weather. The anthropogenic hydrocarbons ethane, ethylene, and acetylene were below 15 ppb. Only acetylene was always found. The maximum amount of pollution occurred with southerly winds due to the influence of the city. The share of acetylene exceeds the other hydrocarbons, although its amount in engine exhausts is less than ethylene and although it is rather strongly absorbed by the moist soil because of its great solubility in water.

27765

APTIC NO. 49351

Nagata, R., T. Hirono, H. Yamazaki, K. Asakuno, K. Nakano, and T. Odaira

AIR POLLUTION BY HEAVY METALS CONTAINED IN PARTICULATE MATTER IN TOKYO. In: Annual Re-

AIR POLLUTION ABSTRACTS, JUNE 1973

port of the Tokyo Metropolitan Research Institute for Environmental Protection. Tokyo Metropolitan Environmental Protection Research Inst. (Japan), p. 5-15, 1972. 9 refs.

Particulate matter concentrations and lead, chromium, nickel, vanadium, cadmium, manganese, copper, and iron content in such particulates were measured in samples collected at nine sampling stations in Tokyo during the Aug. 1969 to March 1971 period. The samples collected on glass fiber filters by means of high-volume samplers over 24 hours were processed with hydrochloric acid and hydrogen peroxide for extraction and for determination of the heavy metal content by atomic absorption spectrophotometry. Apart from some minor inconsistencies, the heavy metals contained in particulate matter were influenced by industrial pollution sources, and behaved in a similar way to sulfur dioxide. Distinct correlation between the Fe, Mn, Pb, Cd, and Cr contents in the particulate matter and their ratio to the particulate matter and to the particulate matter concentration were found. However, the proportion of Cu in particulate matter varied randomly by area, and was low, in some locations, even if the particulate matter concentration there was high. Fairly close correlation between the Fe and Mn concentrations in particulate matter was noticed. Additional consideration should be given to the correspondence between heavy metal components and the concentration of particulate matter for shorter monitoring periods, e.g., 1 hr. Environmental standards covering particulate matter seem to be sufficient for the control of heavy metal concentrations in most cases.

27766

APTIC NO. 49393

Nagata, Rinko, Tomio Hirono, Hiroshi Yamazaki, Kunihiko Asakino, Kinji Nakano, and Toshio Ohira

POLLUTION BY HEAVY METALS IN TOKYO METROPOLIS. (Tokyo tonai no jukinzokuosen ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Ann. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 3:3-10, March 1972. 9 refs.

Suspended dust was measured in Tokyo continuously from Aug. 1969 to March 1970 and from May 1970 to March 1971. Suspended dust quantity and dust composition (lead, chromium, nickel, vanadium, manganese, copper, and iron) were measured to find their relationships to one another and to emission sources. The concentration of Fe was highest, followed by Pb, Mn, Cu, V, Ni, Cr, and Cd in that order. The concentration of Fe was 1000-10,000 times that of Cd. Except for Cu, concentrations were higher for the total amount of dust and for each heavy metal at industrial locations. The regional distribution of sulfur dioxide was similar to that of total dust and heavy metals which indicates the SO₂ sources are the same as dust sources. Carbon monoxide and lead had practically no correlation when measured 100 m from an intersection. While CO mostly comes from automobiles, Pb can be attributed more to industrial sources than automobiles.

27767

APTIC NO. 49260

Nakagawa, Yoshihiro and Kokei Takata

ATMOSPHERIC FLUORIDE POLLUTION AROUND STEEL WORKS AND FERTILIZER PLANTS. (Seitetsu-kojo oyobi seihhi-kojo shuhen chiku ni okeru fusso kagobutsu ni yoru taiki osen). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 189. 2 refs. (Nov. 7-9, Paper 144.)

As a simple method of estimating the degree of pollution, the water soluble fluoride content in suspended particulates were measured. Environments of a steelworks and a fertilizer plant were examined. The relationship between fluoride level and other pollutants was also examined. Hi-vol and low-vol samplers with glass fiber filters were used for sampling. The measurements were analyzed by a comparison with a fluorine ion calibration line. An ion strength adjustment buffer solution was used to give ion strength and to eliminate interference by ferrous aluminum. Of the 11 measuring points at the iron-

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works, the maximum concentrations were 464.5 micrograms/cu m of suspended particulates and 1.012 micrograms/cu m of soluble fluorides. Averages were 194.6 and 0.273 micrograms. Correlations among suspended particulates were: dusts 0.428, manganese 0.686, zinc 0.586, iron 0.563, lead 0.526, and cadmium 0.449. The highest amount of suspended particulates in the environment of the fertilizer plant was 184.8 micrograms/cu m, and fluorides 0.438 microgram/cu m; averages were 112.3 and 0.118. Significant correlations (1%) were recognized between fluorides and all other elements in the surroundings of the ironworks; but only 1% correlation between dusts and fluorides and 5% correlation between cadmium and calcium were recognized near the fertilizer plant.

27768

APTIC NO. 49207

Nakamura, Toyokuni, Hiroshi Kobayashi, and Mitsuo Takata
MEASUREMENT OF LOCAL AIR POLLUTION IN THE CONCENTRATED AREA OF CHEMICAL FACTORIES IN ITABASHI WARD, TOKYO. (Tokyo-to Itabashi-ku no okeru kōjo shūchū chūkyū no kyōkuchiteki taiki ōsen chōsa ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 181. (Nov. 7-9, Paper 136.)

There are approximately 200 chemical factories in the Itabashi ward in Tokyo, and 50% of them are concentrated in the northern part of the ward. Measurements of various pollutants were taken there. Nitrogen oxides are produced by automobiles and factories, but the ratio was not clear. Of the three measurements taken, 0.02 ppm was the highest nitric oxide concentration; the averages ranged from 0.02 to 0.05 ppm. At all locations, NO concentration tended to be higher during the hours from sundown to midnight. The highest nitrogen dioxide measurement was 0.95 ppm, and the averages were 0.015-0.035 ppm. Ammonia (highest concentration, 0.036 ppm) clearly came from a chemical factory nearby. The maximum hydrogen chloride concentration was 0.035 ppm at two measuring points; but the figures will probably surpass this if measurements are taken for a longer period of time. The chlorine maximum was 0.0018 ppm. Carbon monoxide measurements were all within the environmental standard; but 2-3 ppm were detected even in the areas far away from the highways. This indicates that automotive exhaust pollution dispersion covers a larger area. The total emission of sulfur dioxide in the ward is more than 4000 N cu m/day, and more than 50% is emitted in this particular area. The measurements were all within the standard; but they are expected to rise in winter. The total dusts collected by a hi-vol sampler were 0.19-0.28 mg/cu m.

27769

APTIC NO. 49144

Nishida, Konosuke, Tsuneo Honda, Kazuhiko Mitsuoka, Masanobu Yamakawa, and Susumu Takata
STUDIES ON THE EMISSIONS OF CO, HC, AND NOX ON CITY ROADS. (Toshi kairō ni okeru CO, HC, oyobi NOx hoshutsuryō no sokutei). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 311. (Nov. 7-9, Paper 258.)

Automotive exhaust emission speed, temperature, and concentration of carbon monoxide and hydrocarbons were measured by a monitoring car driven alongside the traffic on various highways. In Kyoto, the amount of total hydrocarbons ranged from 26.5 g/km (when the average driving speed was 23.7 km/hr) and 88.0 g/km (when the average driving speed was 14.3 km/hr). The highest emission of CO was noted (82.5 g/km or 52.3 g/min) between Kobe and Nishinomiya on Route 43, when the average driving speed was 38 km/hr. The total hydrocarbon measurement then was 66.0 g/km or 41.8 g/min. A relative small emission was noted when the speed was extremely high (83.1 km/hr) between Nishinomiya and Osaka on the Meishin Express, where CO and HC average was 2.3 g/km or 3.2 g/min, and the total hydrocarbons were 1.8 g/km or 2.5 g/min. The lower the driving speed, the higher the concentration of emission gases.

27770

APTIC NO. 49554

Nishikawa, Yoshinori

STUDIES ON THE ATMOSPHERIC CONCENTRATION OF POLYNUCLEAR AROMATIC HYDROCARBONS IN URBAN AIR (2) - RESULTS OBTAINED IN 1971 (JAN.-DEC.). (Toshi taikichū no takan hokozoku tanka suisō ni kansuru kenkyū (2) - 1971 nen (Ichigatsu-Junigatsu) no sokutei kekka). Text in Japanese. Osaka-fu Kōgō Kanshō Senta Chōsa-Shitsu Kenkyū Hokoku (Proc. Res. Sect. Osaka Environ. Pollution Control Center), no. 3:7-10, Dec. 1972. 3 refs.

Concentrations of benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, and perylene were measured in 1971 in Osaka. A significant correlation was found between benzo(a)pyrene and other hydrocarbons. Therefore the amount of polycyclic aromatic hydrocarbons can be estimated from measurement of just the benzo(a)pyrene. Sampling, extraction, separation by thin layer chromatography, and determination by fluorescent spectrophotometry of the polynuclear hydrocarbons is discussed. Benzo(a)pyrene concentrations were greater than benzo(a)anthracene at both measuring spots. Both benzo(a)pyrene and benzo(a)anthracene increased during the winter.

27771

APTIC NO. 49303

Nose, Yoshikatsu

STUDIES ON THE ACTUAL CONDITIONS AND ON PROBLEMS OF COUNTERMEASURE CONCERNING AIR POLLUTION IN MINE CITY. (Mine-shi no taiki ōsen no genjō to taisakujo no mondaiten). Text in Japanese. Yamaguchi Sangyō Igaku Nenpō (Ann. Rept. Soc. Yamaguchi Ind. Health), vol. 18:68-74, March 1972. 2 refs.

Air pollution was studied in the industrial city of Mine, Japan, from Jan. 1964 to March 1968. The residential area is downwind from a cement factory which causes increased pollution levels. Dust fall has increased in Mine, contrary to the tendency of other areas within Yamaguchi Prefecture. Meteorological factors such as wind direction and velocity influence dust fall. Insoluble matter in dust increased with southwest wind, and soluble matter (especially sulfate) was in direct proportion to precipitation and easterly wind. With the increase of fuel consumption, sulfur dioxide in the atmosphere increased and the dust pH became acidic. Despite industry's efforts to decrease dust emissions, air pollution has worsened. Mine is situated in a ravine where mists are likely to form. City planning, including reallocation of land according to use, and pollution control programs must be improved.

27772

APTIC NO. 49519

Oikawa, Kikuo, Yoshito, Okubo, and Katsunori Honma

ANDERSEN SAMPLER II, METAL CONCENTRATION, AND PARTICLE SIZE DISTRIBUTION OF ATMOSPHERIC SUSPENDED PARTICULATES. (Andersen sanpura (II), Taiki fuyū ryūshijō busshitsuchū kinzoku seibun no ryūdō bunpu). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 91. (Nov. 7-9, Paper 46.)

The characteristics of aerosol particle distributions were studied by using a standard aerosol and the Andersen Sampler. The distribution of metal elements were also studied. Samplings were taken in Kawasaki's industrial, commercial, and residential areas for three days in July and in Sept. 1971. Screen boxes were set on roofs 10-15 m above the ground, and samplings were taken at 28.3 l/min. The sampling slides (glass) were weighed and extractions were made by nitric acid. Iron, manganese, lead, zinc, copper, and nickel were measured by the atomic absorption spectrophotometry. According to the aerosol metal cumulative weight percentage and particle sizes, the aerosol formed a regular logarithmic distribution, and 50% of the particle cumulative weight percentage were within 1

micron. Iron had a logarithmic distribution, and 50% of the cumulative weight percentage were in the area of 2.5 micron. Fifty percent of zinc, copper, and nickel were less than 0.5 micron, and 50% of lead were in the area of 0.1 micron.

27773

APTIC NO. 49621

Prietsch, W., A. Ja. Chesina, K. Wettig, H. Kahl, and T. Petrowa

FURTHER STUDIES OF THE CONCENTRATION OF CARCINOGENIC HYDROCARBONS OF ATMOSPHERIC AIR IN THE VICINITY OF BUSY TRAFFIC INTERSECTIONS. (Weitere Untersuchungen ueber den Gehalt kanzerogener Kohlenwasserstoffe der atmosphärischen Luft in der Umgebung von Verkehrsschwerpunkten). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12):941-943, 1972. 3 refs.

In earlier measurements of the hydrocarbon concentration of atmospheric air at two busy traffic intersections in Berlin over the summer months, the concentration was as high as that in comparable cities. The concentration measurements were taken over the winter months. Fluorescence spectroscopy was used for determination of the polycyclic hydrocarbons. A detailed description of the sampling and measuring procedure is given elsewhere. At the first measuring point a 3,4-benzopyrene concentration of 2.3 micrograms/100 cu m was measured and at the second measuring point 1.5 micrograms/100 cu m. A comparison with the concentrations measured in the summer shows that there is little difference between the values. The higher 3,4-benzopyrene concentrations in winter due to domestic heaters does not taper off in summer due to the higher traffic density.

27774

APTIC NO. 49062

Stalker, W. W. and Phyllis M. Moore

AIR-BORNE POLLEN AND FUNGUS SPORE PATTERNS IN THE BIRMINGHAM, ALABAMA, AREA. Ann. Allergy, 30(6):326-334, June 1972. 7 refs.

Air-borne pollen and spore patterns were evaluated at nine different stations across the metropolitan area of Birmingham, Alabama. Air-borne tree pollen was present from January through May, grass pollen from April into October, and weed pollen from August into December. The most apparent fungus spore season was established from April into November, with the highest monthly mean count in August. (Author abstract modified)

27775

APTIC NO. 49184

Suzuki, Shigetugu, Toshimasa Azuma, and Tatsuji Hatade

AIR POLLUTION IN OITA. (III). (Oita-shi ni okeru io sunkabutsu ni tsuite (daisanpo)). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 184. (Nov. 7-9, Paper 139.)

More than 2000 data collected on the sulfur oxides concentration in Oita and Saganoseki since 1964 were analyzed. The concentrations in Oita had a gradual yearly increase since 1964, mostly doubling the amount; in areas distant from factories and in agricultural areas, pollution increased almost three times, showing the effects of high stacks. The yearly increase rate of pollution became higher since the end of 1969, when oil substituted coal. Measurements in Saganoseki decreased since 1969 or remained the same. Monthly fluctuations showed low concentration in summer and high concentration in fall and spring, showing the effects of seasonal winds. But the automatic meter records showed no correlation between the counts and the wind direction, wind frequency, and the emission sources.

27776

APTIC NO. 49185

Tomita, Kinuko, Toshio Kawayara, Takasuke Haruki, and Michio Oka

SOME TRIALS FOR ENVIRONMENTAL IMPROVEMENT IN TOLL BOOTHS. (Kosoku doro ryokinsho no kankyo kaizen e no ichi teian). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 322. (Nov. 7-9, Paper 269.)

Two highway toll booths in Osaka with air conditioners in heavy traffic areas were examined, and the temperature, humidity, air current, nitric oxide, nitrogen dioxide, carbon monoxide, dusts, and lead content in the air were measured inside and outside the booths. Booth F was located on a flat land where the traffic was 200-300 cars/hr, mostly small and middle size automobiles. Booth M was on a bridge 5 m above the ground, where the traffic was 700-800/hr - mainly trucks and heavy vehicles. Booth F had an air supply vent 3 m from the ground, a prefilter, a high performance filter, and an activated carbon filter with 720 cu m/hr ventilation. Booth M had an air supply vent 11 m above the ground, an air filter, an electrostatic precipitator, an activated carbon filter, and ventilation of 403 cu m/hr. All the pollutant measurements showed the good effect of an air vent located at a high place. The fresh air supply was an effective method of alleviating the harm of exhaust gas for the workers of toll booths. The elimination efficiency of filters for CO, NO, and NO₂ could not be determined clearly.

27777

APTIC NO. 49396

Udagawa, Mitsuru, Saburo Fukuoka, and Ruo Miyagawa

RELATIONSHIP OF CONCENTRATIONS OF NITROGEN OXIDES AND OTHER POLLUTANTS. (NOx to tano osenbusshitsu tonu nodokankei ni tsuite). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol 3:57-72, March 1972. 5 refs.

The relationship between nitrogen oxide, sulfur dioxide, and carbon monoxide concentrations was studied. Automobiles account for 99.8% of the total CO emissions, 2.8% of the SO₂ emissions, and 36.7% of NO_x emissions. Industries account for 0.2%, 97.2%, and 63.6% of the respective emissions. Nitric oxide and CO and nitrogen dioxide and SO₂ have high interrelations. The simple correlation coefficient of concentration was 0.6-0.7 in 1970 at several Tokyo measuring stations. The coefficient was higher in the winter than the summer. No NO-CO correlation was noted in the spring and summer except at one station. A significant NO₂-NO correlation occurred at the other stations in the spring. The relationship of NO concentrations to those of other pollutants was low due to the conversion of NO to NO₂. Hourly changes in correlations were tabulated by each measuring station. The NO₂:NO:SO₂ correlation was 1:2:1 as the yearly average, 1:2:1.2 in the summer, and 1:2:0.9 in the winter. The CO:NO:NO₂ ratio was 100:2:1, 100:1.5:0.5, and 100:2.4:1.2 as the yearly average, in the summer, and in the winter, respectively. The CO:NO plus NO₂:SO₂ ratio was 100:3:1, 100:3:1.5, and 100:3.7:1, respectively.

27778

APTIC NO. 49116

Yamane, Yasuhiro, Motokazu Miyazaki, and Yasunobu Nagata

STUDIES ON AIRBORNE NICKEL IN KEIYO INDUSTRIAL AREAS. (Keiyo kogyo chitai no okeru taiki osen busshitsu toshite no nikkeru). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 96. (Nov. 7-9, Paper 51.)

Air pollution by nickel in the Tokyo-Chiba industrial area was investigated. Samplings of settling particles were taken by deposit gauges in various parts of Chiba and Ichihara cities. Suspended particulates were simultaneously sampled by a low-volume air sampler with millipore membrane filter at 30 l/min.

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Insoluble ashes in settling particles, and 1/2 of the filter paper of suspended particulates burned to ashes were used as material for analysis by colorimetry. The measurements agreed well with the measurements by spectrophotometric analysis. The monthly fluctuation patterns of both settling particles and suspended particulates showed extraordinarily high figures for Oct.-Dec. 1971 in Ichihara. The seasonal pattern of fluctuation appeared very clearly. This is the effect of the wind, and the pollution sources are presumably the ironworks in Chiba city. The nickel content in the suspended particulates in this area is ordinarily similar to the 1964 average in the United States (0.032 micrograms/cu m); but during Oct.-Dec. this nearly doubled in Ichihara. The Oct. measurements of Ni content in settling particles in Ichihara was approximately 0.5 micrograms/mg of ash.

27779

APTIC NO. 49115

Yoneyama, Etsuo, Yoko Endo, Minoru Kitazume, and Yoji Yoshinaga

POLLUTION OF THE AIR AND THE SOIL BY HEAVY METALS PRODUCED BY A BATTERY FACTORY IN YOKOHAMA. (*Denchi koje fukin no jukinzoku ni yoru taiki oyobi dojo osen*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 94. (Nov. 7-9, Paper 49.)

The heavy metal content in the suspended particulates and soil in residential areas surrounding a battery manufacturing plant in 1971 in Yokohama was measured. Samplings of suspended particulates were taken by a hi-vol air sampler with filter paper, and lead, cadmium, and nickel were analyzed by atomic absorption spectrophotometry. An area of 1 sq km of soil was divided into checkerboard squares of 100 m each, and 121 intersections of these mesh were selected as sampling points. Soil solutions were also analyzed by atomic absorption spectrophotometry. During Nov. and Dec. 1971 when the samplings were taken, points in the lee yielded higher measurements than the points in the wind direction. The measurements were within the environmental standards of Kanagawa Prefecture, but they were higher compared to those in other parts of Yokohama. The maximum metal content in the residential area soil was higher than the minimum figure in the factory area. The lead content minimum in the factory was 1000 ppm, and the maximum in the residential area was 5700 ppm; the mean figure was 233 ppm. The minimum cadmium content in the factory was 9.7 ppm, the maximum in the residential area was 13 ppm, the mean figure 1.31. The minimum nickel figure in the factory was 97, the maximum in the residential area 290, and the average 39 ppm.

1971

27780

APTIC NO. 49339

Environmental Measurements, Inc., San Francisco, Calif.

SO₂ AND NO₂ MEASUREMENTS. METROPOLITAN LOS ANGELES, CALIFORNIA. 13-16 JULY 1971. *Environmental Protection Agency Contract 6H-02-0124, Task B, APTD-1148, 42p., Aug. 1971.*

NTIS: PB 212423

Sulfur dioxide and nitrogen dioxide emissions were measured simultaneously by a correlation spectrometer. Perimeter measurements were made on the premises of a steel plant, and perimeter and direct, stack-exit emission measurements were made off premises at a natural gas-fueled power plant. Reconnaissance surveys were conducted to select an appropriate extended-source site for future work, and regional surveys of these gases were taken across the Los Angeles Basin. The spectrometer and measurement techniques are described. Measurable amounts of SO₂ and NO₂ were present downwind of the two principal sources. The dispersal pattern of the NO₂ plume was traced for four miles. The presence of NO₂ was also detected very close to the stationary stack sources. Re-

gional air pollution maps were produced across the Los Angeles Basin. These maps give a relative basis to the source measurements. Emissions were also measured during stack sampling.

27781

APTIC NO. 49860

International Joint Commission, Ottawa (Ontario), St. Clair-Detroit Air Pollution Board

JOINT AIR POLLUTION STUDY OF ST. CLAIR-DETROIT RIVER AREAS FOR INTERNATIONAL JOINT COMMISSION, CANADA AND THE UNITED STATES. APTD-1305, 266p., Jan. 1971. 43 refs.

NTIS: PB 212635

An air pollution emission and air quality inventory was conducted in the Port Huron-Sarnia and Detroit-Windsor areas of the United States-Canada borders. Data were collected on particulates, sulfur dioxide, hydrocarbons, dust fall, odors, fluorides, carbon monoxide, hydrogen sulfide, nitrogen oxides, and oxidants; trace metal concentrations in particulate matter; meteorological factors; seasonal variations; emission sources; and effects on vegetation and materials. Dispersion models were used to calculate pollutant transboundary flow and local pollution. Costs were calculated for implementing remedial measures. Based on the data, a transboundary flow was determined across both the St. Clair and Detroit River international boundaries. Transboundary and local pollution both exceeded the level that is detrimental to the health, safety, and general welfare of citizens and to property. An emission inventory was conducted on fuel combustion, refuse disposal, solvent losses, and point sources. Control methods and equipment are described for boilers, steel mills, cement plants, lime plants, fertilizer plants, grain handling, sugar companies, petroleum refineries, chemical plants, automobiles, power plants, and grey-iron foundries.

27782

APTIC NO. 49568

Iwamoto, Yoshitora, Yoshihiro Ikeda, and Tadashi Yamasaki

INVESTIGATIONS ON AIR POLLUTION, REPORT NO.

1. REPORT OF THE INVESTIGATION OF AIR POLLUTION IN THE KARATSU AREA, SAGA PREFECTURE, AND AIR POLLUTION CONDITIONS IN THE PREFECTURE. (*Taiki osen ni kansuru chosa, Daiippo, Saga-ken Karatsu chiku taiki chosa hokoku, fukenko no taiki osen chosa jokyō*). Text in Japanese. Saga-Ken Eisei Kenkyusho-ho (Rep. Saga Prefect. Inst. Public Health), no. 9:55-72, 1971.

The measurement of air pollution was started in 1967 in Saga Prefecture at five locations. At present, nine deposit gauges (0.6) and 13 lead dioxide meters in Karatsu, four D.G. and four PbO₂ in Imari, one D.G. and two PbO₂ in Saga, and two PbO₂ meters in Arita form a network for monitoring. The results of measurement between Jan. 1967 and Dec. 1970 in the Karatsu area are given in this report. The rain quantity, the total settling particles, the amounts of soluble elements, insoluble elements, and tar, pH, and sulfur trioxide were measured. The amount of settling particles along the coast of Karatsu Bay was extremely high, ranging 10 to 20 t/sq km/mo, due to the road construction and the landfill of the Bay in progress during this period. However, as a general trend, the total amount of settling particles decreased every year, partly due to the increased amount of oil fuel mixture in coal. The amount of oil fuel increased from 50% of 1967 to 90% in 1971. Soluble elements in the settling particles have decreased from 5.68 t/sq km/mo in 1967 to 2.044 in 1970. The amount of insolubles fluctuated between 4.5 tons to 5.5 t/sq km/mo, but the latest average was 3.024 t/sq km/mo. The average of tar content decreased from 0.0514 t/sq km/mo to 0.0252. The pH was generally between 5.1 and 6.2. The SO₃ average was generally in the area of 0.33 or 0.32 mg/100 sq cm/day.

27783

APTIC NO. 49887

Pillay, K. K. S., C. C. Thomas, J. A. Sondel, and C. M. Hyche
MERCURY POLLUTION OF LAKE ERIE ECOSPHERE.

Preprint, American Chemical Society, Washington, D. C.,
24p., 1971. 18 refs. (Presented at American Chemical
Society, Northeast Regional Meeting, 3rd, Buffalo, N. Y.,
Oct. 11-14, 1971.)

The distribution of mercury in the ecosystem of Lake Erie was monitored using a highly sensitive and reliable neutron activation analysis procedure. A variety of samples from the fauna and flora of the lake as well as those from its immediate environment were analyzed for their mercury content. The mercury content of air particulates from the Buffalo area ranged from 1.1 to 27.2 nanograms/cu m. The mercury content of sediments as well as of plankton/algae samples collected from Lake Erie were in the respective ranges of 0.5-12.4 and 2.8-33.5 micrograms/mg, while corresponding samples collected at the mouth of Buffalo River contained 1.4-6.8 and 1.2-81 micrograms/mg of mercury. Edible tissues of Lake Erie fish contained 0.20 to 0.79 micrograms/m. The corresponding mercury content in edible portions of walleyes were in a range of 0.44-1.03 micrograms/mg. Brain tissues of long-time residents of the Lake Erie Basin contained 0.02 to 2.27 micrograms/m of mercury. The results of this survey indicate a widespread distribution of mercury in air particulates; in coal samples of the region; in sediments, plankton/algae, and fish samples from the lake; and in the brain tissues of long-time residents of the Lake Erie Basin.

1970

27784

APTIC NO. 49904

Stratmann, H. and H. Ixfeld

SULFUR DIOXIDE EMISSION MEASUREMENTS IN
NORTH RHINE WESTPHALIA. FROM NOV. 1, 1968
TO OCT. 31, 1969. (Schwefeldioxid- Immissionsmessungen
im Lande Nordrhein-Westfalen vom 1.11.1968 bis zum
31.10. 1969). Text in German. Schriftenreihe Landesanstalt
Immissions und Bodennutzungsschutz Landes Nordrhein-
Westfalen (Essen), no. 20:1-09, 1970. 9 refs.

Since Nov. 1964 sulfur dioxide emission measurements have been taken in large parts of the North Rhine Westphalia. They were carried out in agreement with the third measurement program of paragraph seven of the emission protection law of the state of North Rhine Westphalia. The results obtained at 4960 measuring points are presented in tables and maps. Compared to the previous years, the SO₂ emissions slightly increased. For the industrial center Ruhr, separate comparative studies of the temporal changes of the concentrations were carried out. The moving hourly averages are used for indicating the changes of the atmospheric SO₂ concentrations in the urban and rural districts of this area over the entire study period. The sulfur dioxide emission will be further monitored in the year 1970.

1966

27785

APTIC NO. 49472

Pritchard, Arthur Herbert, Jr.

ATMOSPHERIC POLLEN INCIDENCE AT KINGSTON,
RHODE ISLAND. Rhode Island Univ., Kingston, Dept.
of Botany, Thesis (Ph.D.), Ann Arbor, Mich., Univ.
Microfilms, Inc., 1966, 125p. 86 refs.

The atmosphere at Kingston, R. I., was sampled during the calendar year 1964 and during July and Aug. of 1965 for the volumetric incidence of airborne spores and pollen and for the percentage composition of spore and pollen types. Samples were collected with the Intermittent Rotoslide, a sampling device designed to collect particles based on the impaction mechanism of deposition. The samples were treated with a

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modification of the acetolysis. The presence of pollen through the year was characterized in five periods, the first and last of which corresponded to the months before and after the flowering season. During these periods the incidence of pollen was consistently less than one pollen per cu m, while dominant wind-pollinated pollen types were collected intermittently. The emergence, rise, peak, and decline of pollen and spore types during the flowering season was characterized in four subunits of the arboreal period by early flowering woody plant types, birch and ash types, oak, hemlock, spruce, and hickory types, and pine type; in the grass period by several grass types, cat-tails, and weedy plant types; and in the ragweed period by ragweed, other members of the composite family, and clubmoss types. A comparison of the volumetric incidence of pollen and spores with daily wind movement and precipitation shows no direct relation between the amount of pollen and wind velocity, but low pollen counts during rainy periods. Many of the pollen types originating from allergenic plant species were probably collected in sufficient concentration to invoke pollinosis.

1962

27786

APTIC NO. 49951

Steigerwald, Bernard John

EFFECT OF AIR CONTAMINANTS ON ATMOSPHERIC
IONS. Case Inst. of Tech., Cleveland, Ohio, Thesis
(Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1962,
143p. 49 refs.

The effects of the urban environment on natural atmospheric ion levels, and quantitative relationships between ion changes and the type, degree and source of air contamination were studied. Particulate stain concentrations (RUDS or Reflectance Units or Dirt Shade), atmospheric lead concentrations, and sulfur dioxide levels were measured, were calculated in and around metropolitan Cleveland. Urban air contained high concentrations of intermediate and large ions and very low concentrations of small ions compared to rural air. The positive large ion concentration was used to study quantitatively the relationship between air contaminants and atmospheric ions. Temperature, humidity, SO₂, and carbon dioxide at ambient concentrations had no effect on large ions. Large ion concentrations correlated only slightly with particulate stain concentration, but correlated very strongly with automobile exhausts. In complex urban atmospheres, the concentration of automobile exhaust is the dominant factor in the alteration of natural atmospheric ion levels.

ATMOSPHERIC INTERACTION

1973

27787

APTIC NO. 49767

Huebschmann, Wolfgang Georg

EMISSION AND ATMOSPHERIC DISPERSION OF
RADIOACTIVE FISSION- PRODUCTS. (Emission und
Ausbreitung radioaktiver Spaltprodukte in der At-
mosphäre). Kerntechnik, 15(2):57-64, 1973. 10 refs.

In connection with the dispersion of radioactive fission products, the dispersion in the atmosphere is reviewed in general terms. For determination of the short term dispersion it is necessary to devise a mathematical model for the activity distribution in an off-gas plume. The fluctuations of the locally measured wind directions may be treated as statistically distributed deviations from a mean value. Accordingly, the activity distribution vertically and azimuthally may be described by a Gaussian distribution. The Gaussian distribution model allows the maximum short term concentration to be expected

which occur at the lowest wind velocity. For longer emission periods, the emitted activities are dispersed more effectively owing to variations of the mean wind direction, wind velocity, and atmospheric stability. The doses for emission periods over one hour and to one year may be calculated on the basis of continuous meteorological plots or statistics.

27788

APTIC NO. 49765

Mikyska, Ladislav

NATURAL DRAFT COOLING TOWERS AND THEIR INFLUENCE ON THE ENVIRONMENT. (*Naturzugkuehltuerme und ihr Einfluss auf die Umgebung*). Text in German. Brennstoff-Waerme-Kraft, 25(2):48-51, Feb. 1973. 5 refs.

For determination of the type and quantity of precipitation in the vicinity of wet cooling towers, a new power plant with a capacity of 800 MW was selected for the measurements. Each of the four cooling towers had a height of 100 m. Each cooling tower discharged 230 Gcal/hr of heat. Two measurement series were taken one in summer and one in winter. The precipitation quantity was measured by the collection method and the pH value by the indicator method with specially prepared paper. Temperature, pressure, and wind velocities were recorded. The results show a pronounced drop of the pH values with increasing distance from the cooling tower. The decrease has asymptotic character. The increase of the acidity of the precipitation indicated that in the immediate vicinity of the cooling tower, larger droplets occur whose pH value approaches that of the cooling water. Mist and rain washed out the acid components. By using the relationship between droplet diameter and the diameter of the trace left on the photographic paper, characteristic curves were obtained indicating the intensity of the precipitation dependent on the distance from the cooling tower. The intensity was mainly dependent on the temperature and wind velocity.

27789

APTIC NO. 49094

Peters, Karl-Heinz

EXPERIENCES WITH THE USE OF A MOTOR LAUNCH FOR MEASUREMENTS OF SO₂ EMISSIONS. (*Erfahrungen mit dem Einsatz einer Barkasse bei Messungen von SO₂-Immissionen*). Text in German. Stadt-hygiene (Uelzen/Hamburg), 24(2):31-32, 1973. 5 refs.

Sulfur dioxide measurements on a launch are discussed. The measurements were taken during the winter months of 1971/72 in Hamburg. Sources were found which emit high SO₂ concentrations which reach a measuring point on high land during an inversion. Out of 28 half-hour values, 27 values showed more than 1.0 mg/cu m of SO₂ at the high land measuring station. At other points nearer to sea-level, about half of this concentration occurred during the same period. This can be explained by the fact that through the temperature inversion, fanning smoke plumes left the industrial stacks. This type of smoke plume produces high pollutant concentrations at those points where it meets a high-rise building or at the top of a hill.

27790

APTIC NO. 49179

Pluss, Dawn H. and Werner Strauss

DUST FALL AND CONCENTRATION DISTRIBUTION MEASUREMENTS AROUND AN ISOLATED CEMENT WORKS. (*Staub, Reinhaltung Luft*, 33(1):24-28, Jan. 1973. 15 refs.

The dust fallout around a cement plant at a rural location was measured by simple funnel collectors. These were 17.8 cm diameter funnels placed on brown glass bottles. In order to avoid the wind blown ground dust, the bottles were placed 3 m above the ground. In addition to dust deposition, the atmospheric dust concentrations were measured (at six sites on three occasions) with high volume, remote location samplers developed for these experiments. The cement plant selected for the measurements was about 3 mi west from the outskirts

of Gie'long, a city with a population of 120,000. The waste gases from the plant are released through either a primary stack of 46.6 m high or a by-pass stack, 47.1 m high. These stacks were 6 m lower than the raw material nodule preheat tower 10 m to the west of the stacks. Thus, the stacks were in the turbulent cavity region of the preheat tower, particularly in winds with a westerly component. The gauges were sited around the works at distances of multiples of 300 m up to 1800 m. Additional gauges were located near two neighboring quarries. Instruments measuring wind speed and direction, temperature, and humidity were set up at ground level close to the works. A total of 20 deposit gauges were set up. The measurements lasted over a period of 2 months. Fallout contours were plotted. They indicated a rapid fall off in deposition away from the 150 m zone. An elongated maximum was notable to the north and northwest, the region of the quarry and haul roads. A minimum was apparent to the east of the plant, due to the shadow effect produced by the tall preheat tower shadowing the exhaust stacks in westerly winds. The dust concentrations measured by the high volume samplers had average values of 0.13 mg/cu m at 100 m, and 0.16 at 300 m. This reduces to a lower value of value of 0.076 mg/cu m at 1200 m from the works.

27791

APTIC NO. 49747

Popa, Bazil and Vasile Iancu

THE PROBABILITY OF CERTAIN CONCENTRATIONS AT THE DISPERSION OF SOLID POLLUTANT PARTICLES IN INDUSTRIAL AREAS. (*Die Wahrscheinlichkeit fuer bestimmte Konzentrationen bei der Ausbreitung fester Schadstoff-Teilchen in Industrie-Gebieten*). Text in German. Staub, Reinhaltung Luft, 33(1):20-24, Jan. 1973. 19 refs.

For determination of the atmospheric pollutant concentration, the wind velocity and the distance from the source is important. The concentration drops with increasing wind velocity. For approximations it is assumed that the concentration is oppositely proportional to the square of the distance. However, wind direction and wind strength are not always the sole criteria for a favorable site of a new plant. They are supplemented by the index of concentration strength, i.e., the ratio between wind frequency and wind velocity. For the erection of important objects which pollute the atmosphere with dust, the presumable pollutant concentration for various distances is estimated. The wind velocity is a coincidental parameter whose values can be determined by means of mathematical statistics. Those laws of mathematical statistics are used which best describe the wind velocities characteristic of the climatic conditions of Romania. The selected mathematical laws permit the extrapolation for various periods of time. The analysis of the distribution of meteorological values as a function of time is carried out with the aid of frequency curves which generally follow a Gaussian distribution with symmetric or unsymmetric branches.

27792

APTIC NO. 49212

Smirnov, V. I. and B. N. Sergeev

ON THE RELATION BETWEEN SIZE-DISTRIBUTION OF CONDENSATION NUCLEI AND LARGE CLOUD DROPS. (*O svyazi raspredeleniy po razmeram yader kondensatsii i krupnykh oblachnykh kapel*). Text in Russian. Dokl. Akad. Nauk SSSR, 208(1):87-90, 1973. 18 refs.

Theoretical studies on the relationship between condensation nuclei and large cloud droplet size distribution are reviewed. While the condensation nuclei size distribution most often obeys Junge's law, the large droplet size distribution involves two discrete ranges: from 10 to 15 micron and up to 30 micron, where condensation on giant particles is predominant. The stepped distribution of large cloud droplets prevails both in convective and stratified clouds.

27793

27793

APTIC NO. 49146

Zitzelsberger, J.

CAUSES AND EFFECTS OF AIR POLLUTION AND THE EXAMPLE OF MUNICH. (*Ursachen und Auswirkung der Luftverschmutzung und das Beispiel Muenchen*). Text in German. *Gesundh.-Ingr.*, 94(2):38-43, 1973. 16 refs.

After a brief discussion of the major pollution sources and the most prevalent emissions, Munich air quality is described. A measurement grid serves the determination of meteorological data such as temperature, humidity, wind direction and velocity as well as the concentrations of oxides of nitrogen, sulfur dioxide, carbon monoxide, hydrocarbons, and dust. The emissions in the center of the city come primarily from heating systems and automobiles. The highest emissions occur during temperature inversions which are more frequent in Munich than in any other city in West Germany. In Jan. 1971 an inversion lasting 11 days caused SO₂ concentrations which considerably exceeded the long-term and short-term maximum allowable emission concentration. After a general review of the dilution of pollutants in the atmosphere, the meteorological conditions of Munich are outlined. The average wind velocity in Munich is 1-2 m/sec compared to 4 to 5 m/sec in Hamburg. The upper limit of the inversion layer is mostly between 50 and 100 m above ground and between 150 and 175 m above ground. Thus high stacks could largely eliminate dangerous emissions over the city. However, in order to maintain the present skyline of the city other solutions must be sought.

1972

27794

APTIC NO. 49119

Tokyo Metropolitan Environmental Protection Research Inst. (Japan)

AN EVALUATION OF THE URBAN REDEVELOPMENT PLAN OF YANAGI-CHO, USHIGOME WARD, BY THE USE OF A WIND TUNNEL SIMULATION (FROM THE AIR POLLUTION STANDPOINT). (*Fudo jikken no yoru Ushigome Yanagicho toshi kaizo keikaku (an) ni taisuru taiki osen men kara no hyoka*). Text in Japanese. Preprint, 7p., Oct. 1972.

The experiment was carried out in a wind tunnel 6 m in length, 2.5 m in width, and 1.5 m in height using ethane as a tracer gas. Measurements were performed at 104 locations at Ohara intersection and 174 locations at Ushigome ward. The average carbon monoxide concentration at Ushigome-cho was higher than 10 ppm from 7:00-20:00 on a typical day. The evaluation of CO concentration from an urban redevelopment model showed that only one location had an average concentration higher than 10 ppm. The construction of a general environmental district on 5-meter high ground was believed to be the major factor.

27795

APTIC NO. 49175

THE MAX PLANCK ASSOCIATION FOR THE PROMOTION OF SCIENCES E. V. ACTIVITY REPORT FOR THE PERIOD OF 1-1-1970 TO 12-31-1971. (*Die Max-Planck-Gesellschaft zur Foerderung der Wissenschaften e.V. Taetigkeitsbericht fuer die Zeit vom 1.1.1970 bis 31.12.1971*). Text in German. *Naturwissenschaften (Berlin)*, 59(12):534-558, 1972.

The activity report of the Max Planck Association spans two years and gives a survey on the scientific activities of the Max-Planck Institute. The Department for Atmospheric Chemistry and Physical Chemistry of Isotopes studies the condensation aerosols which helped to explain characteristics of the total particle number observed or described in literature. Measurement flights yielded interesting carbon monoxide profiles in the sub-stratosphere. After a rapid decrease of the mixing ratios above the tropopause a new stable value was found which was interpreted as the equilibrium between CO

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production by methane dissociation and CO destruction by hydroxyl radicals.

27796

APTIC NO. 49250

Kanagawa Prefectural Government (Japan), Pollution Control Bureau

THE RESULTS OF AN INVESTIGATION OF THE DISTRIBUTION OF AIR POLLUTANTS CONTINUOUS MOVEMENTS (AIR POLLUTION IN THE UPPER LAYER). (*Taiki osen ido renzoku bunpu chosa kekka ni tsuite (joku ni okeru taiki osen jokyō)*). Text in Japanese. Preprint, 11p., Dec. 1972.

An investigation was conducted early in Aug. 1972 using a light plane carrying a spectrometer for measuring nitrogen dioxide concentration, a nephelometer for measuring aerosol, a doppler radar guiding equipment, and a thermometer. The NO₂ concentration in the sea bank area including Kawasaki city, Tsurumi ward, and Kanagawa ward of Yokohama city was higher than other areas, sometimes as high as 80 ppm. The same tendency of NO₂ distribution was found in the winter according to a previous investigation. The high NO₂ concentration in the summer was found at a height of more than 1000 m above ground, while that in winter was usually at below 500 m. High aerosol (airborne particulates) concentration was found in in-land areas, sometimes as high as 360 micrograms/cu m.

27797

APTIC NO. 49281

Kanagawa Prefectural Government (Japan), Pollution Control Bureau

THE RESULTS OF THE INVESTIGATIONS AND GENERAL ANALYSES OF THE VERTICAL DISTRIBUTION OF AIR POLLUTANT CONCENTRATION. (*Taiki osen busshitsu no kodobetsu nodo bunpu (rittai) chosa sogo kaiseki kekka ni tsuite*). Text in Japanese. Preprint, 2p., Dec. 1972.

The ozone concentration in the upper layer of atmosphere in the entire area including Tokyo gulf and Sagami gulf increased when sea wind blew toward the land and the front was staying. When a weak wind from south was blowing at 2-3 m/sec, Tokyo gulf and Sagami gulf areas showed low O₃ concentrations and in land areas showed high O₃ concentration. Occasionally higher layers of approximately 500-1000 m above the ground showed 2-3 times higher O₃ concentrations than the ground when the ground oxidant concentration was high. When O₃ concentration in the upper layer of the atmosphere was high, the nitrogen oxide concentration was generally low and the unsaturated hydrocarbon concentration in the total hydrocarbons was high.

27798

APTIC NO. 49326

Japan Environmental Agency, Tokyo, Bureau of Atmospheric Safety

AN INVESTIGATION OF AIR POLLUTION BY AUTOMOTIVE EMISSION GASES AND THE STUDIES OF POLLUTION FORECASTING. (*Jidosha haishutsu gasu ni yoru taiki osen no jittai chosa to osen yosoku no kenkyū*). Text in Japanese. 109p., Sept. 1972.

The carbon monoxide concentrations, traffic conditions, and meteorological conditions at two intersections in Tokyo were measured. The CO concentration was compared to that from an air pollution prediction system. Air was sampled in 20 l vinyl bags for 5 min during the periods of 8-9 am, 10:30-11 am, 3-3:30 am, and 5-6 am on a non-raining day with wind velocity below 8 m. The observed values at 1.5 m above the ground were consistent with the prediction calculations. The two values were always consistent at monitoring stations where measurements were continuously performed. On the roof of a 31 m structure, the observed value was remarkably higher than the calculated value.

27799

APTIC NO. 49577

Japan Public Health Assoc.

A REPORT ON THE COMMISSIONED RESEARCH WORK FOR 1971 ON AIR QUALITY MEASUREMENTS. (*Showa-46-nendo kankyo nodo rittai chosa itaku kenkyu hokokusho*). Text in Japanese. 60p., July 1972. 33 refs.

Analyses of air pollution data in Los Angeles based on the air pollution control plan reveal that there is a stage distribution of hydrocarbon reactivities. From the biological effect point of view, the reactivity of a mixture of hydrocarbons is limited to ethylene and 1-alkenes (olefins). In order to control the hourly peak oxidant concentration below the environmental standard value, it is necessary to impose more strict regulations of nitrogen oxides rather than non-methane hydrocarbons. Further analyses show that the ratios of carbon monoxide or ethylene to NO_x from emitting sources is not reflected from the air sample collected in the morning on days of high oxidant concentrations. Photodissociation of nitrogen dioxide, photochemical reactions caused by ultraviolet radiation, and helicopter and tetraon sampling data from Los Angeles are discussed.

27800

APTIC NO. 49614

Kanagawa Prefecture (Japan), Public Nuisance Center and Japan Meteorological Assoc., Tokyo

WEATHER IN THE KEIHIN INDUSTRIAL DISTRICT. (*Keihin Kogyochitai no kisho*). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:58-74, Feb. 1972.

Meteorological conditions during 1970 are reviewed in relation to sulfur dioxide concentrations during this period. Yokohama data on sea level atmospheric pressure, average temperature, maximum and minimum temperatures, humidity, wind, rainfall, and insolation are presented on a monthly basis. In January when high concentrations of SO₂ occurred on 2 days, the wind velocity was 2.7 m/sec and 2.5 m/sec. Generally the wind direction on high concentration SO₂ days was mostly north, followed by south-southwest, south-southeast, southeast, and north-northeast. The wind velocity on such days ranged from 1.9 to 5.2 m/sec. The general weather was good. Wind velocity and temperature by altitude were measured to investigate the effects of atmospheric temperature inversions and wind velocity.

27801

APTIC NO. 49719

Bay Area Air Pollution Control District, San Francisco, Calif., Technical Services Div.

AIR QUALITY AND GROWTH IN MARIN COUNTY. A PILOT STUDY TO ASSESS THE IMPACT OF GROWTH UPON THE AIR QUALITY OF THREE BASINS IN MARIN COUNTY. 38p., June 1972. 5 refs.

The impact of growth on the air quality of southeastern Marin County was investigated using a climatological-statistical air pollution model and background information on current air quality and meteorology. The physiography and climatology of the area were studied, including topographic interaction potential, wind patterns, inversion base heights, temperature data, stability conditions, and solar radiation values. Current air quality was tabulated with respect to concentrations of suspended particulate matter, carbon monoxide, oxidants, nitrogen dioxide, and hydrocarbons. Current air quality was good, and air quality standards were not frequently exceeded because of low emissions and favorable geographic parameters. The potential for contaminant accumulation, however, was high. Contaminant measurements were almost exclusively automobile-related; a transportation system modification, therefore, based on a bus-oriented transit system, should result in substantially better future air quality. (Author abstract modified)

27802

APTIC NO. 49480

Arkin, Gerald Franklin

WIND STRUCTURE MODELS OVER PLOWED FIELDS AND SOIL PARTICLE TRANSPORT WITHIN A TURBULENT BOUNDARY LAYER. Illinois Univ., Urbana, Dept. of Agricultural Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 108p. 48 refs.

An experimental investigation of wind structure models and soil particle transport within a turbulent boundary layer is described. An analysis of wind profile data for a wind passing above the roughened soil surface in the wind tunnel indicates that the velocity profile differs from one downwind position to the next, which is due to mechanical energy losses. The boundary layer was heterogeneous. The turbulent intensity increases as the soil surface within the turbulent boundary layer is approached. Soil particle concentration data within the turbulent layer suggest the existence of a linear relation of particle concentration to height. Soil particles apparently accumulate within the boundary layer until a maximum concentration is reached. Roughening the soil surface permitted a large portion of the particles to extend into the steep velocity gradient of the turbulent boundary layer, i.e., the protruding particle height was greater than the wind profile roughness height. These soil particles are lifted into the turbulent boundary layer. When the wind tunnel is operated for over 3 min the soil surface becomes noticeably smoothed, as the soil particles on the upper surfaces of the roughness projections become airborne and are blown away. Only smooth plateaus with deep cavities remain. The concentration of airborne soil particles is reduced as the roughness height and the protruding height of the soil particles approach equality. This process is further complicated by the slow, but continuous growth of cavities and the associated vorticular flow patterns within these small cavities. Thus, the roughness height, turbulence level and free stream velocities, as well as particle protrusion into the boundary layer, are the important correlating parameters involved in lifting the fine soil particles into turbulent flow field. Wind flow within both the field and modeled cotton seedbeds is at least two-dimensional and therefore cannot be resolved by one-dimensional analysis. The transfer of heat, mass, and momentum is restricted because the spatial cavities within the cotton seedbed are aerodynamically isolated from the overhead free stream turbulent motion.

27803

APTIC NO. 49141

Budyko, M. I.

THE FUTURE CLIMATE. *Trans. Am. Geophys. Union*, 53(10):868-874, Oct. 1972. 20 refs.

Man has influenced the climate by artificial irrigation which changes local climate, by shelter belts which lower the wind speed over fields and weaken the intensity of vertical air motions near the earth's surface, by large reservoirs which promote stronger winds, and by coal burning which produces carbon dioxide. Carbon dioxide has increased by 10-15% in the last century, and this amount is rising by approximately 0.2% a year. By blocking long-wave heat radiation from being radiated out to space, CO₂ increases in the atmosphere may account for a .5 C increase in the Earth's temperature. Energy production has produced additional heat which increases the mean air temperature near the Earth's surface by about 0.01 deg; this value is negligible, but because of the irregularity of distribution of energy sources over the Earth's surface, such a rise in temperature is much greater in some regions. A simple numerical model of the atmospheric thermal regime is based on the equation of heat balance of the Earth-atmosphere system. This model can be used to take account of the feedback between the ice cover and the thermal regime of the atmosphere. With a 2% decrease in radiation, a complete change in the glaciation of the planet would occur; with an increase in radiation by several tenths of a percent, a complete melting of polar ice would occur. This model can be used to establish the causes of climatic changes in the past. Consideration of increased CO₂ and periodic changes of the Earth's surface position in

relation to the sun can yield information on probable climatic and glaciation changes. The present rate of energy production growth will cause the thermal barrier to be reached comparatively soon when a substantial rise in air temperature will take place. Polar ice may retreat markedly to the north at the end of the century and completely melt in the middle of the next century.

27804

APTIC NO. 49453

Bullin, Jerry Allen

HYBRID COMPUTER SIMULATION OF TURBULENT DIFFUSION IN THE ATMOSPHERE BY MONTE CARLO METHODS. *Houston Univ., Tex., Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 191p. 105 refs.*

Turbulent diffusion in the atmosphere was simulated by implementing a new Monte Carlo method on a hybrid computer. The new method involved the development of a stochastic Langevin equation which required the instantaneous wind velocity as input information to simulate the diffusion process. With several established models for the mean wind profile, but none for the fluctuating component of the velocity being available, a model was developed using empirical equations to describe the root-mean square value as a function of position and using independent Gaussian white noises of proper frequency range and power spectral densities. The present method was evaluated by comparing the results to the theoretical dispersion in a homogeneous flow and to experimental concentration profiles in a boundary layer and in the atmosphere. All of the experimental flow fields were nonhomogeneous. Good agreement was found in all cases. The simulated concentration distributions had a 95% statistical reliability by a chi-square goodness-of-fit test. Since the current method simulates the diffusion process directly, it has great flexibility and the concept of eddy diffusion coefficients is not used. Essentially all meteorological effects can be fully utilized. The present method is also applicable to multiple sources of almost any type.

27805

APTIC NO. 49372

Carabine, M. D.

INTERACTIONS IN THE ATMOSPHERE OF DROPLETS AND GASES. *Chem. Soc. Rev., 1(3):411-429, 1972. 101 refs.*

The mechanisms of kinetic processes in the atmosphere involving interactions between droplets and gases and accompanied by transfer of material across the phase boundary are reviewed. These mechanisms include the nucleation of particles in supersaturated vapors, coagulation of particles by Brownian motion, and reaction between aerosols and sulfur dioxide in the gas phase by photochemical oxidation, in water droplets with or without catalysis, and on the surface of suspended solid particles.

27806

APTIC NO. 49966

Dabberdt, Walter F. and F. L. Ludwig

AN URBAN DIFFUSION MODEL FOR VEHICULAR POLLUTANTS. *Preprint, American Inst. of Aeronautics and Astronautics, New York; Public Technology, Inc.; American Inst. of Chemical Engineers, New York; American Inst. of Mining, Metallurgical and Petroleum Engineers (AIME), New York; American Society of Mechanical Engineers, New York; Council of State Governments; Inst. of Electrical and Electronics Engineers, New York; International City Management Assoc.; National Assoc. of Counties; National Governors Conf.; National League of Cities; National Society of Professional Engineers; Society of Automotive Engineers, Inc., New York; and Conf. of Mayors, 12p., 1972. 16 refs. (Presented at the American Institute of Aeronautics and Astronautics Urban Technology Conference and Technical Display, 2nd, San Francisco, Calif., July 24-26, 1972, Paper 72-637.)*

AIR POLLUTION ABSTRACTS, JUNE 1973

A practical multi-purpose urban diffusion model was developed for predicting concentrations of inert vehicle-generated pollutants. For simplicity, the modeling effort was restricted to carbon monoxide and tested extensively in San Jose and St. Louis. The model requires only routinely available meteorological and traffic data to produce areal concentration isopleths, sequential hourly point values, and frequency distributions. A street-effects submodel was developed to account for the high concentrations and large gradients in street canyons. The meteorological parameters included mixing height, atmospheric stability type, and transport wind speed and direction. Submodel design, general model applications, and model evaluation results are examined. The extension of the model to include traffic dynamics and reactive pollutants is discussed. (Author abstract modified)

27807

APTIC NO. 49506

Doerre, W. H.

THE TEMPORAL DISTRIBUTION OF THE MASS CONCENTRATION OF ATMOSPHERIC DUST. (*Zur zeitlichen Verteilung der Massenkonzentration des atmosphärischen Staubes*). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete (Berlin)*, 18(12):943-946, 1972. 8 refs.

The data from short-term measurements of the atmospheric dust concentration taken in Berlin and Bitterfeld followed approximately a logarithmic normal distribution. For this evaluation four measurement series taken at two different places were used. The dust measurement unit used operated on the principle of beta radiation absorption. An empirical relationship between the distribution parameters for various sampling times of the individual sample existed so that the frequency distribution of the concentrations of a measurement series whose individual samples were taken within a certain period of time could be used for calculation of the frequency distribution of a measurement series whose individual samples were taken within a different length of time.

27808

APTIC NO. 49789

Ensor, David Samuel

SMOKE PLUME OPACITY RELATED TO THE PROPERTIES OF AIR POLLUTANT AEROSOLS. *Washington Univ., Seattle Dept. of Civil Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 131p. 197 refs.*

A general theoretical relationship between plume opacity and the particle mass concentration was developed. The parameter K formed from the Bugner law was a strong function of the particle absorbing refractive index for mass mean radii less than the wavelength of light and the particle mass mean radius for particles larger than the wavelength of light. That parameter was less sensitive to changes in the physical properties of the aerosol (mass mean particle radius and refraction index) for polydisperse sized aerosols than for monodispersed sized aerosols. Strongly light absorbing particles are less sensitive to changes in the physical properties of the aerosol than non-absorbing aerosols. The averaging of the light scattering effects by polydispersed aerosols was verified with the aluminum refinery source test results. The geometric mass mean diameter ranged over two orders of magnitude but the parameter K had varied by a factor of two. The kraft recovery furnace source test results exhibited similar averaging effects.

27809

APTIC NO. 49061

Ewing, R. H.

POTENTIAL RELIEF FROM EXTREME URBAN AIR POLLUTION. *J. Appl. Meteorol., 11(8):1342-1345, Dec. 1972. 16 refs.*

Potential relief from extreme urban air pollution is discussed. Surface inversion formation can be avoided if the thermal power of a city is greater than the radiational heat loss of its streets and structures. Inversion formation is explained, and the condition for inversion avoidance is derived and compared

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to a projection of the nighttime heat output of United States cities. Several cities presently satisfy the avoidance condition in the winter months, and New York City will satisfy the condition year-round by the end of the century. An improvement in urban air quality will accompany the decline in inversion frequency. (Author abstract)

27810

APTIC NO. 49905

Fortak, Heinz

POSSIBLE USES OF MATHEMATICAL-METEOROLOGICAL DISSUSSION MODELS IN CLEAN AIR MAINTENANCE PROBLEMS. (Anwendungsmöglichkeiten von mathematisch-meteorologischen Diffusionsmodellen) Freie Univ. Berlin (West Germany), Inst. fuer Theoretische Meteorologie, zur Loesung von Fragen der Luftreinhaltung) Text in German. Minister of Labor, Health and Welfare of North Rhine Westfalia Rept., 52p., 1972. 38 refs.

The problem of mathematical meteorological dispersion models as used in clean air maintenance strategies is reviewed. Mathematical meteorological dispersion models are suitable for the technical and economic optimization of pollution alarm systems and planning. Despite several difficulties involved in physical, physiochemical, mathematical, and especially in meteorological problems encountered in model development, there are presently models available which are applicable to single emission sources and to given urban areas and regions. A survey over the models available shows the applicability, at a high degree of reliability, of such models to planning and design problems, e.g., minimum required stack heights, and even to predictions on micro meteorological changes brought about by improved emission control methods, new urban development projects, and by additional emission sources. Efforts to develop time-dependent models for emission forecasts, and methods permitting the optimization of control and planning activities in emission-oriented environmental protection are among the basic trends in dispersion model development.

27811

APTIC NO. 49064

Galbally, I. E.

PRODUCTION OF CARBON MONOXIDE IN RAIN WATER. *J. Geophys. Res.*, 77(36):7129-7132, Dec. 20, 1972. 16 refs.

The carbon monoxide supersaturation of rain water was studied, and a dynamic model was constructed to predict the observed daytime supersaturation levels. The hypothesis of CO production was based on the photolysis of formaldehyde and higher aldehydes by ultraviolet light (sunlight). The model dynamics and postulations are reviewed. The relevance of the hypothesis to CO supersaturation in ocean surface waters was also considered, since the ocean surface water appears to be a major source of CO in the global cycle. (Author abstract modified)

27812

APTIC NO. 49527

Hayakawa, Morihiko, Masaru Kitase, and Yoji Naruse

AIR POLLUTION PATTERN OF MAIN POLLUTANTS. (Shuyo taiki osen bussitsu no osen patan). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th 1972, p. 175. (Nov. 7-9, Paper 130.)

If the pattern of pollution distribution is to take a given form under the same conditions such as the effective stack height and stack distributions, the formulation of a representative pollution diffusion course should be possible. By applying this formula to unknown pollutants, it may be possible to grasp the total pollution picture in a minimum amount of time. For this purpose, the concentration fluctuations of sulfur dioxide, oxidants, and hydrogen sulfide were analyzed. Fifteen minutes each of average concentration for these pollutants were taken,

selecting most drastically fluctuating time. According to the results, the fluctuation rate of H₂S was tens of times over those of SO₂ and oxidants. With SO₂, 7% of the total measuring time showed an index more than double the concentration of the total average, and only 1.3% of the time was the index more than triple the total average. With oxidants, 6.3% was more than double, and 1.6% was more than triple. With H₂S, 11.3% was more than double, and 3.3% was more than triple. This indicates that H₂S, or a local pollutant, has a wider range of, and a more frequent concentration fluctuation than SO₂ and oxidant which are both large area pollutants. The pollution characteristics are determined by the line formed by the maximum concentration and time, the steeper the inclination of the line, the more localized is the pollution.

27813

APTIC NO. 49788

Heimbach, James Alvin, Jr.

A VARIATIONAL TECHNIQUE FOR MESOSCALE OBJECTIVE ANALYSIS OF AIR POLLUTION. (Oklahoma Univ., Norman, Dept. of Meteorology. Thesis (Ph.D.). Ann Arbor, Mich.: Univ. Microfilms, Inc., 1972. 95p. 38 refs.)

A variational technique employing air quality monitoring data was developed to obtain spatial estimates of contamination of a mesoscale area. A source inventory can be estimated from this technique which employs two or more contamination measurements and a reputable analytical diffusion model to best fit strength to a system of strategically placed hypothetical sources as well as determined an optimal background contamination. At least two samples are needed because there is a minimum of two unknowns. The samples can be from the same time if they are not from the same location or as few as one per time period if the diffusion model reflects changing dispersion conditions. The solved parameters are applied in the same diffusion model to estimate the true contamination patterns with an optimal ensemble of plumes. A variational filter is then implemented to smooth the noisy portions of the analysis. The testing of the techniques on simulated data was satisfactory. Real sulfur dioxide data were obtained from a survey of the Blackwell Zinc Company, Okla., and use of these data gave realistic patterns.

27814

APTIC NO. 49433

Hirokawa, Ichiro, Yuhei Nakazawa, and Masato Maruyama

AIR POLLUTION BY FLUORIDE IN THE OMACHI DISTRICT. (Nagano-ken Omachi-chiku ni okeru tokkabutsu ni yoru taiki osen ni tsuite) Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th 1972, p. 188. (Nov. 7-9, Paper 143.)

Fluoride near an aluminum refining factory was measured by the LTP method, and the fluoride accumulation in red pine needles was used as an index for pollution. The monitoring stations were installed at 15 locations covering 5 km east to west and 10 km south to north surrounding the aluminum plant. The fluoride accumulation was checked monthly from May 1971 to April 1972. One-year-old red pine needles were collected, and F content was determined by the photometric method. In the north-south directions, approximately 750 micrograms/100 sq m/mo was accumulated at 400 m from the plant and 250 micrograms at 800 m. The accumulations were only 20-30 micrograms in the east-west directions. In the south, seasonal fluctuations were great; they were 80-100 micrograms/mo in the summer, but the amount was four or five times greater in the winter. Near the plant, the F accumulation in pine needles was 200-300 ppm. In the leeward side, even at distances of 15,000 to 20,000 m, 20 to 30 ppm F were found. In this area, the wind was predominantly northerly and pollution extended to the south. There was a high correlation (0.977) between yearly accumulation of F and the F content in pine needles.

27815

APTIC NO. 49136

Hodges, John A.

AEROSOL EXTINCTION CONTRIBUTION TO ATMOSPHERIC ATTENUATION IN INFRARED WAVELENGTHS. *Appl. Opt.*, 11(10):2304-2310, Oct. 1972. 10 refs.

The atmospheric attenuation in several good transmission windows (3-5 micron and 8-14 micron) is estimated for long, approximately horizontal slant paths near sea level using relatively unsophisticated techniques. Within these windows, aerosol extinction -- scattering and liquid absorption -- has a significant contribution to overall atmospheric attenuation. The estimates consist of separate estimates of gas and water vapor absorption, aerosol extinction, and aerosol liquid absorption. Estimated spectral aerosol extinction and absorption coefficients between the wavelengths of 2-14 micron are plotted for a wide variety of relative humidities and aerosol nucleation particle distributions. Computer estimates of total attenuation are compared to widely accepted field measurements; the agreement is sufficiently good to provide a basis for estimating infrared instrument performance under similar conditions. The results also confirm the contention that most nucleation particle density distributions can be thought of as a combination of continental and maritime distributions. The high aerosol absorption near 10 micron emphasizes that this contributor to signal energy loss is underrated by most workers in infrared. Relative humidity is as important as absolute humidity for estimating infrared transmission. Aerosol extinction at 2 and 10 micron can be equal or very different. Aerosol extinction at about 10 micron under clear conditions is little affected by the particle distribution. The very steep increase in aerosol extinction at wavelengths longer than 11 micron may explain why the spectral band-limit optimization predictions based on field data tend to be near 9-11 micron, while those based on gas and water vapor absorption only tend to have a soft long-wavelength limit.

27816

APTIC NO. 49822

Huff, F. A. and S. A. Changnon, Jr.

CLIMATOLOGICAL ASSESSMENT OF URBAN EFFECTS ON PRECIPITATION. (FINAL REPORT) PART II. DESCRIPTION OF INDIVIDUAL URBAN STUDIES. Illinois State Water Survey, Urbana, National Science Foundation Grant GA-18781, 241p., May 1972. 55 refs.

Urban effects on precipitation at St. Louis, Chicago, Indianapolis, Cleveland, Washington, D. C., Houston, New Orleans, and Tulsa were investigated. The relationship of thunder and hail increases to urban size and pollution factors was studied; the hydrologic implications of inadvertent weather modifications were also studied. Data on the individual urban studies are presented, including analytical procedures, data analysis techniques, spatial and time charts of rainfall patterns, diurnal, monthly, and seasonal variations, topographic interaction parameters, particulate and thermal emission data, and meteorological functions.

27817

APTIC NO. 49204

Irie, Takehisa, and Susumu Yoshizawa

CHARACTERISTICS OF POLLUTANTS DISPERSION WITHIN CHANNEL SPACES (I). (*Mizo jo kukannai no osen kukusan no seijo ni tsuite (I)*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 279. (Nov. 7-9, Paper 233.)

Some basic studies on pollutant dispersion characteristics in channel spaces were made. The observations were made in an unfinished flume-like road in a residential area of Kanagawa Prefecture. The distribution of air current was measured by a thermocouple wire anemometer; wind directions were measured by an anemometer; and pollutant dispersion was measured by a digital dust counter. The pollutant dispersion pattern in a channel space was rather irregular and unpredictable.

Within the imaginary space centering around each measuring point, ventilation frequency/min was obtained and compared with average wind velocity; the turbulence intensity of other channel space segments taken simultaneously were compared. The random fluctuation of the air currents in the channel made it very difficult to compare the pattern with the ordinary wind. From the total actual measurement data, the general wind velocity of 0.2-4.3 m/sec, and 0-24 times/min frequency of ventilation in the channel were obtained.

27818

APTIC NO. 49542

Ito, Masashi, Saburo Fukuoka, and Toshio Ohira

STUDY ON MEASUREMENT OF LOCAL WIND IN CITY. (*Toshi ni okeru kyokushofu no sokutei ni taisuru kosatsu*). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 3:27-32, March 1972. 7 refs.

Turbulence or complex flows of wind occur in a municipal area due to high buildings and other characteristics peculiar to such an area. This necessitates a microscopic analysis of wind characteristics in cities to study atmospheric diffusion of air pollutants. From this viewpoint, a study was made to find wind characteristics in and over selected locations in Tokyo. A few types of air speed meters (anemometers) currently in use were also reviewed. The air speed meters, one an ultrasonic type, another a propeller type, and the last an air-cup type, all gave a satisfactory response to winds of 2 m/sec or higher velocity, but the propeller and air-cup types could not accurately respond to a wind velocity of less than 1 m/sec. Generally, wind velocity slowed in a city. A dead water zone and complex turbulence occurred leeward of buildings which act to twist the wind flow. Wind velocity and direction fluctuate considerably, and air mass stands almost still when the wind is weak. A finer measurement of wind velocity is necessary for the transport mechanism analysis than the 10-minute average wind velocity value. The vertical distribution of wind must also be studied for such analysis. As a result of the spectrum analysis, it was found that the energy of turbulence produced by small vortex currents is greater in a block with many buildings.

27819

APTIC NO. 49456

Jeffries, Harvey Edward

AN EXPERIMENTAL METHOD FOR MEASURING THE RATE OF SYNTHESIS, DESTRUCTION, AND TRANSPORT OF OZONE IN THE LOWER ATMOSPHERE. North Carolina Univ., Chapel Hill, Dept. of Environmental Sciences, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, 1972, 319p. 24 refs.

The total time rate of change of the low-layer ozone concentration, composed of the individual time rates of change due to synthesis, destruction, and transport, was experimentally measured at a semirural piedmont field station in North Carolina for 16 days (4680 4-minute cases) in Jan. and Feb. 1971 by means of a two-flask non-steady state gas phase continuous stirred tank reactors (CSTR). A CSTR is a chemical reactor that provides direct measurement of rates of chemical reactions. If one CSTR is operated in the dark, using the ambient atmosphere as its reaction medium, a direct measurement of the time rate of change of ozone due to the destruction is possible. If a second CSTR is operated in the sunlight, a direct measurement of the sum of the time rate of change due to destruction and time rate of change due to synthesis is possible. The daytime ratio of mean rate of synthesis to mean rate of destruction was -0.22. The mean rate of net transport was -0.89 times the mean rate of destruction in the daytime; at night the ratio was -0.90. The relative decrease from daytime to nighttime for the mean values of rate of net transport and rate of destruction were 0.55 and 0.56, respectively. The rise in daytime O₃ concentration was on the average due to synthesis; that is, the magnitude of the rate of synthesis is greater than the rate of transport. The nighttime decrease in O₃ con-

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centration was on the average due to the absence of synthesis and the imbalance between transport and destruction. Rain was accompanied by a decrease in ambient O₃ concentration. The ambient O₃ concentration was also strongly related to wind speed. Synthesis of O₃ occurred under an inversion aloft in the mornings; the boundary layer was unstable at 30 ft and weakly stable at 120 ft. This confirms previous observations at the tower site that O₃ concentrations increased near the ground before the inversion aloft was broken.

27820

APTIC NO. 49575

Junod, A.

REMARKS ON METEOROLOGICAL CONSIDERATIONS FOR THE PREVENTION AND SUPERVISION OF ATMOSPHERIC POLLUTION IN SWITZERLAND. (*Incidence des considerations meteorologiques sur la prevention et le controle de la pollution atmosferique en Suisse*). Text in French. *Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA*, Basel, Switzerland, 1971, p. 268-276, 1972.

Meteorology effects the emission of pollution into the atmosphere, dispersion, and low-level pollution. Pollution dispersion forecasting is difficult in a country like Switzerland with its uneven, sharply contrasting surface formations. Mountains and construction effects call for the application of more sophisticated mathematical diffusion models than in flat countries. The complex thermic stratifications which often occur in deep surface folds must also be taken into account. The relationship between pollutant production and meteorological factors is discussed using heating as an example. Sulfur dioxide emissions are in proportion to the consumption of fossil fuel, which in turn depends on outside temperature and wind. Elaborate thermic insulation of buildings and optimum heating regulation could reduce pollution. Chimney height and speed and ejection temperature of stack gases influence the initial dispersion of pollutants. Too low ejection speeds can cause direct contact of the effluents with the ground. Low-level pollution control depends on accurate monitoring of sensitive points and the use of forecasting models.

27821

APTIC NO. 49523

Kasahara, Mikio and Kanji Takahashi

ULTRAVIOLET RADIATION ON PHOTOCHEMICAL SMOG. (*Kokagaku sumoggu to shigaisen shosha ni suite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 64. (Nov. 7-9, Paper 12.)

Various factors influencing the permeability of light in the air were used as parameters, and the intensity of ultraviolet radiation on the surface and the light absorption speed of sulfur dioxide in the atmosphere were calculated. The solar radiation in the area of ultraviolet was actually measured. The total light, direct light, scattering light intensity, wave spectrum, and ultraviolet light were calculated. The spectrum of the absorption speed wavelengths is shown by a graph, and the relationship between absorption speed and the environmental factors is indicated on another graph.

27822

APTIC NO. 49569

Kertesz-Saringer, M. and T. Varkonyi

EXPERIENCES IN HUNGARY WITH THE SO₂ DETERMINATION IN ATMOSPHERIC AIR WITH AN AUTOMATICALLY RECORDING INSTRUMENT. (*Erfahrungen in Ungarn bei der SO₂-Bestimmung in der atmosphärischen Luft mit einem selbstregistrierenden Instrument*). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete* (Berlin), 18(12):917-920, 1972.

A total of four automatically recording sulfur dioxide measuring units are in operation in Budapest. They are the Ultragas 3 and the Pikoflux methods. The operating principle of the two units is reviewed. The measurements taken with the Pikoflux

between 1968 and 1970 were punched on a tape and evaluated by a mechanical data processing unit. The average SO₂ concentrations dropped below 0.20 mg/cu m only during 5 months of the year. The average values in winter were between 0.20 and 0.60 mg/cu m. The diurnal characteristics of the SO₂ pollution were alike in summer and winter with a morning and evening maximum. During the heating season the morning maximum occurred at 8 am during the summer period at 7 am. The evening maximum occurred in winter between 6 and 8 pm; in summer the evening maximum did not occur generally at one time; the SO₂ concentration rose steadily until 10 pm. Through increase of the wind velocity, the SO₂ concentration diminished.

27823

APTIC NO. 49776

Kifune, Ikuei, Ryuichi Sugai, and Toshikazu Okita

THE RELATION BETWEEN THE CONCENTRATION OF ODOR AROUND A PULP FACTORY AND THE INTENSITY OF ITS EMISSION SOURCES IN NIIGATA PREFECTURE, JAPAN. (*Niigata-ken ni okeru parupu kojo shuhen no akushugasu nodo to hasseigen kyodo tono kankei*). Text in Japanese. Preprint, Ministry of Health and Welfare (Japan) and Japan Environmental Sanitation Center, Tokyo, p. 70-71, 1972. (Presented at the National Environmental Sanitation Meeting, 16th, Niigata, Japan, Oct. 19-20, 1972.)

The actual state of the odorous substances discharged from a Kraft Pulp factory in Niigata Prefecture and the offensive odor smelled in the vicinities of the pulp factory were investigated by means of instrumental and olfactory analyses in order to determine their relationship. The data obtained from this investigation were further used to formulate their relationship in accordance with the Weber-Fechner's law. The derived formula produced the predicted values closely approximating to those actually measured. Of all the emission sources of bad odor substances in the factory, the worst was the entrance to the high tower where methyl mercaptan was 103,483 ppm, dimethyl sulfide 22,754 ppm, and hydrogen sulfide 674.3 ppm; the degree of the offensive odor detected by olfactory sensation was 500,000 deg/cu ft.. Concentrations at the exit of the tower were 52,500 ppm for CH₃SH, 4030 ppm for (CH₃)₂S, and 2.05 ppm for H₂S, which became diluted to 1/2-1/300 as they were discharged into the atmosphere. Eighteen measuring spots were selected within 1500 m from the factory, some within 500 m some others within 1000 m, and the last group within 1500 m. The minimum involution was applied to develop a formula that can predict degree of odor propagation at a given spot from the concentration of odor substances discharged at an emission source. The values calculated by this formula were then compared with those obtained by the actual measurements to verify their validity. The correlation factor was 0.914, thus considered effective.

27824

APTIC NO. 49142

Kitabayashi, Koji

THE ATMOSPHERIC DIFFUSION AND ITS PREDICTION. (*Taiki kakusan gensho to sono yosoku*). Text in Japanese. *Keisoku to Seigyō (Meas. Control)*, 11(10):855-866, Oct. 1972. 29 refs.

Atmospheric diffusion, air pollution, and its prediction for mainly urban areas are discussed and explained mathematically. The topics of discussion include: theoretical calculation of atmospheric diffusion, data handling, the thermoconductivity differential equation calculation of dispersion, plume behavior, micrometeorology and its observation, atmospheric stability and layers, turbulence measurements and characteristics, the plume distributions of temperature and humidity, the weather observation technique by an airplane, the use of lidar, topographical interferences of atmospheric movements, local winds, atmospheric movements over the mountains, valley winds, and sea and land breezes. The static and dynamic models for air pollution forecasting are explained. The

metropolitan Tokyo model is grouped by various patterns of pressure locations, wind direction and intensity, and local concentrations of sulfur dioxide. The Osaka Prefecture air pollution forecasting model is designed for short range forecastings from 30 min to several hours, and is based on the wind direction, wind velocity, and the pollutant concentration at various monitoring locations.

27825

APTIC NO. 49187

Kitano, Taku

ENVIRONMENTAL SURVEY OF DUST RESEARCH IN A CEMENT PLANT. (*Semento kojo shuhen no funjin chosa*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 251. (Nov. 7-9, Paper 205.)

Measurements of settling particles and suspended particulates were taken for 6 months in the vicinity of a cement plant, and dispersion field tests were conducted to analyze the amount of calcium oxide and the effects of dusts from the plant on the environment. Dust jars were installed at 29 locations at various distances from the stack of the plant, and suspended particulates were measured by high-volume samplers. A control area was chosen at a location 4 km away from the stack. An analysis of samplings from July to Dec. 1971 shows that the arc at 200 m from the stack had the largest quantity of CaO, and the amount decreased drastically as the distance increased. Approximately the same figure as the control area was reached at the sampling location 2000 m away from the stack. The maximum quantity at the 200 m arc was obtained in August, amounting to 4.57/sq km/mo. Sulfur fluoride (SF₆) was used as a tracer for the dispersion test. The Pasquill dispersion equation was used, and the Chamberlain adjustment was given; the Pasquill result was compared with the Sutton calculation. Calculations were obtained by classifying particles by size, size distribution, and the amount in average particle sizes.

27826

APTIC NO. 49524

Konishi, Toshio

MEASUREMENT OF SOLAR ULTRAVIOLET RADIATION AND PHOTOCHEMICAL SMOG PRODUCTION. (*Shigaisen no sokutei to kokagaku sumoggu ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 65. (Nov. 7-9, Paper 13.)

Some years ago, solar ultraviolet radiation was measured over a long period and compared with Los Angeles, data in order to study the method of oxidant pollution forecasting by the decrease in ultraviolet radiation. The study was interrupted for lack of high performance ultraviolet radiation measuring apparatus. In this study, the data were reevaluated and combined with data on visible and infrared solar radiation, and some hints were made for the future development of photochemical smog forecasting. The minimum ultraviolet radiation wavelength is believed to be about 290 millimicron. The wavelengths show extremely sensitive reactions to pollution. Photochemical reaction is believed to occur by the reaction of pollutant to 290-350 millimicron wavelengths. Therefore, the comparison of scanning detections of ultraviolet waves between 290-400 millimicron and those of infrared with the wavelengths in nonpolluted areas may give some hints for the mechanism of photochemical smog formation.

27827

APTIC NO. 49619

Kudo, Hideko, Masaaki Suzuki, Shinji Wakamatsu, Yoshio Saiki, Yasuji Himi, and Saburo Sugano

A STUDY ON THE ATMOSPHERIC DISTRIBUTION OF OXIDANT OZONE, AND OTHER POLLUTANTS. (*Taikichu no okushidanto, ozon sonota no osenbusshitsu no bunpu ni kansuru ichi kosatsu*). Text in Japanese. Preprint, Ministry of Health and Welfare (Japan) and Japan Environmental Sanitation Center, Tokyo, p. 66, 1972. (Presented at the National Environmental Sanitation Meeting, 16th, Niigata, Japan, Oct. 19-20, 1972.)

AIR POLLUTION ABSTRACTS, JUNE 1973

The wide-range atmospheric distribution of the pollutants was analyzed, based on the 1971 data obtained by automatic oxidant recorders installed at the 26 measuring points throughout Kanagawa Prefecture. For the measurements at the Kanagawa Middle School where a number of the victims were reported in May and June of last year, the measuring instruments for oxidant, sulfur oxides, and wind direction/velocity were placed in the classrooms where more victims were reported. For Zama City, oxidant, ozone, nitrogen oxides, and other pollutants were measured at and about the City Office site where high oxidant concentrations had been reported frequently. Using these data, an analysis was made as to whether the selected measuring points are representative of the district. Ozone concentrations at altitudes up to 1000 m were measured using a helicopter, in order to analyze the vertical distribution. On days when a higher ozone concentration was reported, there were almost invariably a shift between sea and land winds taking place from 900 to 1500 hours and a line of discontinuity was detected. Higher oxidant concentrations were reported more often in the area where a line of discontinuity existed. In the Kanagawa Middle School, higher oxidant concentrations occurred between 900 and 1500 hours also, generally coinciding with the time pattern showing higher concentrations of ozone and sulfur oxides at such hours. A high degree of correlation between oxidant and ozone was also observed at the Zama City Office, the correlation factor being 0.98. The vertical distribution of oxone varied depending on the meteorological conditions; the higher the altitude, the higher the concentration or vice versa.

27828

APTIC NO. 49590

Kurtschatowa, G., M. Tschutschkowa, and I. Kalpasanow

ATTEMPT OF FINDING A QUANTITATIVE RELATIONSHIP BETWEEN THE POLLUTION OF ATMOSPHERIC AIR WITH SEVERAL PHOTOOXIDIZERS AND ULTRAVIOLET RADIATION. (*Versuch zur aufstellung einer quantitativen Charakteristik zwischen Verunreinigung der atmosphärischen Luft mit einigen Photooxydantien und der Ultraviolettstrahlung in Sofia*). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12):930-931, 1972. 8 refs.

The relationship between the degree of atmospheric pollution by oxides of nitrogen and other oxidizers and the ultraviolet intensity on the earth's surface was studied in 1970 on a busy traffic intersection in Sofia and in a village near Sofia. The samples for the determination of the oxides of nitrogen and the other oxidizers were taken with the aspiration method. Nitrogen dioxide was analyzed by the Griess-Islovsky method. The total quantity of oxidizers was determined by means of the reaction with phenolphthalein. For measuring the intensity of the ultraviolet radiation, the spectrophotometric method was used. The concentration of oxides of nitrogen measured on Vysraschdane-plaza was 0.0320 ± or 0.0101 mg/cu m, at the Orlov bridge 0.0137 ± or 0.0022 mg/cu m, and in the village of Gradoman 0.0010 ± or 0.003 mg/cu m. The ultraviolet radiation intensity on Vysraschdane plaza was 3412 mW/sq cm/sec, at the Orlov bridge 3217 mW/sq cm/sec, and in the village of Gradoman 2352 mW/sq cm/sec. Thus, a reversible relationship existed.

27829

APTIC NO. 49994

Kurtz, Uwe

THE SPECTRAL DEPENDENCE OF THE RADIATION EXTINCTION AND THE INFLUENCE OF THE RELATIVE HUMIDITY ON IT. (*Zum spektralen Verlauf der Strahlungsextinktion und ihrer Beeinflussung durch die relative Luftfeuchtigkeit*). Text in German. Meteorol. Rdsch., 25(5):134-140, 1972. 23 refs.

Measurements of the radiation transmission can be used to determine the spectral dependence of the extinction coefficient of the aerosol particles in the atmosphere. This coefficient is a measure of number, size, and behavior of the atmospheric dust particles in distinct intervals of radii. Theoretical and ex-

perimental results of different kinds of spectral coefficients depend on the relative humidity of the air. Four different kinds of extinction exist which can be found by studying the entire wavelength range from 0.1 to 30 micron. The theoretical considerations were based on a grain size distribution of the aerosol of 0.05 to 10.0 micron. It was assumed that they were ruled by a power law. The measurements were taken with a transmissometer. The spectral characteristic of the haze extinction coefficient confirms that the aerosol grain size distributions do follow a power law with an exponent equaling three according to Junge. Other measurements yield a grain size distribution with a marked maximum around a diameter of 0.3 micron. Abnormal extinction was measured on four days at relative humidities of more than 10%. The decrease of the haze extinction coefficient between 0.4 and 0.5 towards lower wavelengths was particularly pronounced. A comparison with the calculations by Danzer and Bullrich shows that the grain size distribution has a maximum in the small particle size range with equivalent radii between 0.04 and 0.3 micron. Under favorable atmospheric conditions without major changes of the number and origin of the aerosol particles, the haze extinction coefficient may change due to swelling or shrinking of particles because of humidity changes.

27830

APTIC NO. 49471

Le Clare, Philip Conrad

A STUDY OF THE EFFECTS OF WATER VAPOR ON THE BEHAVIOR OF SUBMICRON IRON OXIDE AEROSOLS. *Rutgers-The State Univ., New Brunswick, N. J., Dept. of Environmental Science, Thesis (Ph.D.), May 1972, 143p. 140 refs.*

The behavior of arc produced iron oxide aerosols in a static system was studied. The concentration of the particles, generated and stored in argon gas, was determined for ages of 4 to 100 min at relative humidities of 0%, 30%, 60% and 90%. Over the same time period and with the same relative humidities, measurements were made of the mass of the aerosol, the fractional penetration of a diffusion battery operated at flow rates from 0.5 to 12 l/min and the fraction of the aerosol having a limiting mobility greater than 0.000012 cm/sec/volt/cm. The coagulation coefficients and diffusion sedimentation loss coefficients were determined from the concentration and mass measurements. The concentration and mass decreased with time in each system while the mean size of the remaining aerosol particles increased. As the aerosol aged, the equilibrium value of charge was closely approached in each system. The growth of iron oxide particles in argon due to coagulation appears to be inhibited in the presence of water vapor. The apparent differences in aerosol size among systems is attributed to differences in shape which alter the resistance of the medium to particle motion. The coagulation coefficients of the particles in the zero relative humidity system are somewhat larger than in the humidified systems, but all are larger than the values predicted by theory. A large dispersion in particle sizes was observed in all systems at all ages, but the dispersion decreased with increasing relative humidity. Thus, for a given size, the coagulation coefficient was smallest at the highest relative humidity. The degree of polydispersity was, then, of primary importance to the enhanced coagulation. After aging for an hour, the aerosol having the largest charged fraction was observed in the zero relative humidity system. This result is consistent with the larger apparent size of the particles and the theory of a size dependent charge equilibrium. The change in the charged fraction, however, is greatest at the highest relative humidity studied.

27831

APTIC NO. 49848

Lininger, Ronald Link

VERTICAL AND TEMPORAL VARIATIONS OF TRACE ELEMENTS IN SURFACE AIR. *Michigan Univ., Ann Arbor, Dept. of Meteorology, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 222p. 60 refs.*

Trace element concentration and size distribution variations as a function of height and time were studied for 12 elements over 34 m at a fixed suburban site near Chicago. Significant vertical decreases about 30% in 34 m were found in daily average concentrations for calcium, aluminum, titanium, magnesium, and bromine; but not usually for manganese, sodium, iodine, indium, chlorine, copper, or vanadium elements having primarily multiple, distant sources. This vertical decrease is related to low-level inputs of soil particles from local sources. For bromine in particular, the lapse observed is ascribed to a combination of auto exhaust input and removal by oxidation loss. In a 6-day sampling experiment, mass spectral distributions and total collections on Andersen Samplers do not vary significantly with altitude for any element. Within individual days, the vertical concentrations vary directly with atmospheric thermal stability. The concentration of soil-derived elements varies inversely as the vertical component of mechanical turbulence and is independent of wind direction and speed. A correlation of -0.85 was obtained. The cleansing action of rain showers was observed in one case; there, the fraction of temporal decrease following the rain varied widely from element to element, and was approximately equal to the amount of the elements mass found on the first four stages of the Andersen Sampler. This finding suggests the principal removal mechanisms are washout and nucleation. Meteorological parameters most useful in interpreting diurnal-study results were wind direction and speed, local temperature lapse over the sampling height interval, vertical wind-direction deviation, and rain amounts. Less valuable were cloud cover, temperature, and azimuthal-wind-direction deviation.

27832

APTIC NO. 49388

Loveck, James E.

ATMOSPHERIC TURBIDITY AND CCL₃F CONCENTRATIONS IN RURAL SOUTHERN ENGLAND AND SOUTHERN IRELAND. *Atmos. Environ., 6(12):917-925, Dec. 1972. 14 refs.*

The seasonal changes in atmospheric turbidity in rural Southern England and Southern Ireland were measured and compared with data on wind direction and concentrations of trichlorofluoromethane. No significant seasonal variation of CCl₃F for any wind direction was determined, but the CCl₃F concentration and the summer time turbidity varied with wind direction in almost identical manners, suggesting that the dense summertime aerosol is a product of atmospheric photochemistry of air pollutants with continental Europe as the principal source. (Author abstract modified)

27833

APTIC NO. 49851

Lynch, A. J. and J. H. Emslie

LOWER MAINLAND AIR QUALITY STUDY. (FINAL REPORT). *Dept. of Lands, Forests, and Water Resources, Vancouver (British Columbia), Chemistry Lab., 126p., Oct. 1972. 38 refs.*

The effect of unique meteorological conditions on the concentration of gaseous and particulate pollutants was investigated in the lower mainland of British Columbia. Air quality statistics, atmospheric pollutant concentrations, meteorological parameters, and computer storage and retrieval system design and operation are reviewed. Motor vehicles were the major source of carbon monoxide, nitrogen oxides, and oxidants; CO was used as a tracer of vehicular emissions. The meteorological parameters included wind speed and direction, temperature, precipitation, solar radiation, sky cover, stability conditions, and atmospheric movements. Topographic interactions were a major study component. Over a period of successive days of similar land breeze/sea breeze conditions, pollutant concentrations increased. During these episodes, the maximum levels of CO, NO_x, and total hydrocarbons and minimum levels of oxidants occurred in the late evening or early morning. The maximum levels of oxidants and minimum levels of CO, NO_x, and hydrocarbons occurred during midday. Levels

of dust fall, composition of dust fall, and sulfur dioxide were also measured. Monthly, seasonal, and daily data is given.

27834

APTIC NO. 49274

Marenco, Alain and Jacques Fontan

STUDYING THE RESIDENCE TIME OF AEROSOLS IN THE TROPOSPHERE BY NUMERICAL SIMULATION MODELS. (*Etude par simulation sur modeles numeriques du temps de sejour des aerosols dans la troposphere*). Text in French. Tellus (Uppsala), 24(5):428-441, 1972. 38 refs.

The residence time of aerosols in the troposphere was studied by numerical simulation models. Three different models were adopted; one for time-independent regime with a plane or stratified source as a function only of altitude, another for the influence of emission discontinuities concerning radon and radon daughters, and a third for washout generated discontinuity in the lower 2-6 km layer in a time-dependent regime with a plane or stratified source for complete and discontinuous washout. The study of the residence times of the radon daughters 210-lead, 210-bismuth, and 210-polonium and of the cosmogenic elements 7-beryllium and 32-phosphorus showed the influence of the vertical exchange phenomena and of the localization of elimination processes (washout and dry sedimentation). The residence time of aerosols was primarily determined by the altitude of formation. A major influence of the discontinuities (source and elimination) on the determination of the tropospheric residence time was observed. The aerosols of 210Pb and 210Bi occurred mostly in the lower, while 7Be occurred mainly in the higher, troposphere. The 210Po had fairly even distribution within the entire troposphere.

27835

APTIC NO. 49227

Meszaros, Erno

CONDENSATION OF ATMOSPHERIC WATER VAPOUR ON NUCLEI WITH UNEVEN SURFACE. (*A legkori vizgöz kondenzáció egyenetlen felületű magvokon*). Text in Hungarian. Időjárás (Budapest), 76(1-2):93-100, Jan.-April 1972. 16 refs.

Based on methods of the phenomenological thermodynamics, a solution to the equation of the free energy of nucleation, applied to the case of nuclei with uneven surfaces, is proposed. The uneven surface is simulated by numerous hemispherical cavities which are of much smaller dimension than the radius of the nuclei. The theoretical model also shows that a certain proportion of Aitken particles may give condensation centers under atmospheric conditions, provided that their surface contains the required number of unevenness and their material is wettable. The results are analyzed with regard to cloud and precipitation formation.

27836

APTIC NO. 49292

Mizoguchi, Isao, Yasuhito Sato, Kuniyoshi Makino, Nobuyoshi Osawa, Midori Chigusa, Hiroshi Nonaka, Nobumoto Nakagawa, Mamoru Nagasaki, Ryoji Udo, and Tatsuo Hitomi

LOCAL FLUCTUATIONS OF OXIDANT MEASUREMENTS ON SCHOOL CAMPUS. (*Gakoo (Kosha, kotei to) no okishidanto chi no hendo ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 66. (Nov. 7-9, Paper 14.)

Fluctuations of photochemical smog were examined inside and outside of school buildings in Tokyo. Two Mast Ozone Meters were used, and fluctuation averages were taken from the charts and presented in graphs. When the windows were closed, the oxygen concentration in the classroom could decrease considerably, and the concentration outside had almost no effect on it. The effect of the curtains were mostly by interruption of shutting off of the air current rather than by

adsorption or decomposition. The altitude did not affect oxidant concentration as much as the wind velocity or direction; concentrations on the ground could be higher or lower than that at the altitude of 13 m. The local differences on the school ground depended on the wind direction, speed, and the direction of the sun. The oxidant concentration fluctuated easily and locally, and at times created much variety nearby.

27837

APTIC NO. 49342

Mount, W. D., A. C. Anway, B. R. Fow, C. M. Maloy, and C. V. Wick

THERMASONDE DATA PROCESSING TECHNIQUES. (FINAL REPORT). Sperry Rand Research Center, Sudbury, Mass., Atmospheric Sciences Lab., Air Pollution Control Office Contract EHSD 71-26, Proj. SRRC-CR-72-5, EPA-R3-72-022, 113p., Oct. 1972. 3 refs.

NTIS: PB 214184

Three data processing techniques -- the analogue technique, the gradient altitude model, and the limited range relaxation technique -- were refined and tested on a small sample of simulated and observed radiometric data. Results were compared and the input data and computer and manpower requirements for operational use of each technique were assessed. Analysis from field experiments revealed a discrepancy between the simulation model and measurement implementation. The significance of the discrepancy and its possible causes were investigated. Radiometric data gathered at various locations and pressure altitudes were used to show that altering the absorption coefficients did not properly correct the simulated profiles under a variety of meteorological regimes. A computer program was formulated which combined the effects of antenna pattern, ground emissivity and reflectivity, radiation transfer, and antenna scanning. A study of different antenna configurations was performed, a cost-effective improved design was determined, and the performance of this configuration was evaluated. Results of the studies are discussed.

27838

APTIC NO. 49224

Naden, Rex A. and J. V. Leeds

THE MODIFICATION OF PLUME MODELS TO ACCOUNT FOR LONG AVERAGING TIMES. Atmos. Environ., 6(11):829-845, Nov. 1972. 19 refs.

A method of extending the valid averaging time of the Gaussian plume model by a statistical procedure requiring a knowledge of the probability distribution of wind direction during the desired averaging time is presented. It is necessary to construct an empirical wind direction power density spectrum in order to find the necessary variance of the Gaussian distribution. The statistical method presented involves more computation than the Gaussian plume model, and is not recommended for multi-source regional dispersion calculations. However, it may be useful for explaining the differences between dispersion patterns taken over various averaging times. Results from the well-known power-law technique for extending plume model averaging times do not agree, in general, with results of the present method.

27839

APTIC NO. 49389

Naito, Haruo, Masataka Hayafuku, Tomio Hirono, Nobuo Ito, Sekio Izumikawa, Kunihiro Asakino, Kinji Nakano, Toshio Ohira, and Hiroshi Yamazaki

ANALYSIS OF SULFUR DIOXIDE TRANSPORT MECHANISMS VIEWED FROM THE SOLID STRUCTURE OF WIND STRATUM. (*Fuso no rittai-ko kara mita arisangasu yusokiko no kaiseki*). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 3:17-26, March 1972. 1 ref.

The diffusion of air pollutants emitted from factories in the Keihin Industrial Zone as they were blown inland by sea breezes was calculated using a non-lift balloon, and by mea-

suring ground wind flow, the vertical distribution of wind and temperature, and ground-level sulfur dioxide concentrations. The vertical distribution of the wind up to 2000 m was measured by two pilot balloons over Tokyo. Temperature distribution up to 1000 m was measured using a helicopter. Measurements were made from Nov. 28 to Dec. 5, 1970. Violent ascending and descending air currents occurred along the front of the sea breeze. Smoke or stack gas from high chimneys diffused in an unexpected manner. High SO₂ concentrations were found at the balloon's landing spot. Ascending and descending currents were jumbled together over downtown Tokyo, which is supposed to be influenced by the sea wind.

27840

APTIC NO. 49333

Naito, Masaaki, Yuji Okamoto, Tatsuo Yamasaki, and Tsugio Mizoguchi

THE DEVELOPMENT OF A MATHEMATICAL MODEL FOR PREDICTION OF CO CONCENTRATION OF THE ROAD BASED ON HYDROGRAPHICAL EXPERIMENTS. (Doronai CO nodo yosoku moderu ni kansuru suiri jikken). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 317. (Nov. 7-9, Paper 264.)

As a method of automotive exhaust pollution control, the control of traffic by the control of road conditions and meteorological conditions is feasible. Various models based on hydrographical experiments were designed and field tests were conducted. The hydrographical method was used because the use of a wind tunnel was prohibitive from the cost standpoint. A mathematical equation was arrived at. The measurements of the model were determined by a non-dimensional number f , the turbulence dispersion index, and the non-dimensional number representing the flowing current. The experiments were conducted taking the case of wind blowing perpendicularly to the road, up above a building. Using an 0.02-0.1 n sodium chloride as tracer, various road conditions and weather conditions, and the concentration distribution of carbon monoxide on the road were measured. The applicability of the model equation based on hydrography was confirmed to a certain extent. The problems which remain unanswered are the similar conditions under slower atmospheric movement, the effects of the density difference between water and the tracer, and the method of application for actual planning of the street and traffic control.

27841

APTIC NO. 49331

Nakajima, Chotaro, Hideo Tagawa, and Masakazu Takahashi

DIFFUSION BALANCES OF AIR POLLUTANTS IN BROAD AREAS. (Taiki osen busshitsu no koichi shuji). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 297. (Nov. 7-9, Paper 251.)

In the Kyoto basin, the pollutants in the area of approximately 100 sq km at the altitude of 300 m and below are almost impossible to escape on a winter morning. The ventilation of this space has to wait for the seasonal breeze that occurs in the afternoon that disperses the pollutants vertically near the ground, for a balance diffusion over the entire area. The case of Jan. 11, 1971 is taken and mathematical calculations are given. At noon, there was total area diffusion; at midnight, there was a bundling in the center of Kyoto and a dispersion in the southern suburbs. The area around Osaka Bay surrounded by the mountains has a daily fluctuation in summer of bundling and dispersion. The sea and land breezes increase the diffusion index, and the turbulence creates ventilation in a large scale over the plain. The effects of adsorption by the ground and water, and the chemical changes in the air must also be considered. These factors, and the measurements of the ground concentration by infrared analyzers and a large area diffusion model are presently under examination.

27842

APTIC NO. 49567

Nakamura, Kimio

FORECASTING OF PHOTOCHEMICAL SMOG IN SOUTH AREA OF KANTO. (Kanto nanbu ni okeru okishidanto koosen no kisho joken to yohoho). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 63. (Nov. 7-9, Paper 11.)

A survey and the forecasting method for a large area of oxidant pollution in South Kanto Plain are presented. The main pollution areas of Tokyo, Saitama, and Kanagawa Prefectures are the Arakawa basin, the Tama River basin, and the Sagami River basin. Heavy pollution tends to appear simultaneously in all three areas. The ratio of the simultaneous occurrences is 40% of the number of total high pollution cases. The simultaneous pollution of Tokyo and Saitama is 24%, Tokyo-Kanagawa is 14%, and Kanagawa only is 12%. Single occurrences of pollution in either Tokyo or Saitama, or simultaneous pollution of Saitama and Kanagawa are extremely limited. The main characteristics for localization of high pollution is the form of sea breeze encroachment. The types causing pollution are the stagnation front, sea breeze, and a mixture of such. Other main factors for high degrees of pollution are solar radiation (especially when the sun shines for more than 3 hr); less than 5 m/sec wind at noon, an upper layer inversion and less than 1500 m MMD, less than 4 km visibility; sunshine or sunshine after cloudiness, higher than 30 °C temperature between June and August and higher than 25 °C temperature other times. The accuracy of forecasting in 1971 was 50-60% when forecasting on the preceding day and 65-75% when forecasting on the same day.

27843

APTIC NO. 49313

Nakano, Michio, Hiroshi Takeuchi, Nobuhiro Sato, Yasushi Mitsuda, Eikichi Fuwa, and Kiyohide Takeuchi

METEOROLOGICAL SURVEY OF AIR POLLUTION IN OSAKA CITY (II). (Osaka ni okeru taiki osen kisho chosa (dainiho)). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 296. (Nov. 7-9, Paper 250.)

Weather and pollution data on March 16, 1972, when a heavy smog appeared in Osaka, were measured by a pilot balloon and helicopter. The upper layer was investigated by a pilot balloon; the horizontal air current was investigated by a nonlift balloon and an anemometer on a helicopter; and the temperature distribution was examined by the helicopter. There was a weak inversion at 240-300 m altitude at 8 am, and the sulfur dioxide concentration increased between 8-9 am due to the northeast land breeze, but the concentration dropped later. About 11 am, the sea breeze front passed west of Osaka; the SO₂ concentration again increased in the west, and the high concentration gradually moved toward inland. The highest concentration appeared at 1 pm in the central Osaka plain. A weak land breeze began to blow in the southeast at 4 pm, but the concentration was more than 0.2 ppm from 4 to 6 pm in the central area. The sea breeze disappeared about 8 pm and the land breeze gained; the high concentration moved toward the shore area.

27844

APTIC NO. 49168

Nishida, Kaoru, Tomonori Ohashi, Koichi Takagi, Takeo Yamamoto, Tamio Arai, Hisaji Yokota, Masanao Funashima, Masashi Ito, Sekio Izumikawa, Mitsuru Utogawa, Saburo Fukuoka, Kunihiko Asakuno, and Toshio Odaira

WIND-TUNNEL EXPERIMENT ON THE ATMOSPHERIC DIFFUSION DUE TO AUTOMOBILE EXHAUST GASES IN THE VICINITY OF OHARA AND USHIGOME-YANAGIMACHI CROSSES. (Ohara kosaten, Ushigome-Yanagimachi kosaten shuhen ni okeru jidoshha haishutsu gasu ni yoru taiki kakusan ni kansuru

Iudo jikken). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 319. (Nov. 7-9, Paper 266.)

The data from a field test and the results from a wind tunnel dispersion experiment were compared for the Ohara intersection in Tokyo in order to estimate the carbon monoxide concentration at the proposed Ushigome-Yanagicho intersection to be constructed by the Capital Redevelopment Bureau. Simulations of the two intersections (Ohara and Ushigome-Yanagimachi) were constructed in a wind tunnel. The front and back parts of the tunnel were made of rough boards in order to create turbulence, and in the center was the model of the intersections. Each model had 16 tracer gas emission holes. The sampling points for the tracer gas were 104 at Ohara, and 174 at Ushigome. The actual measurements at Ohara and the wind tunnel measurements were mathematically analyzed, and an equation was obtained. Judging from the result, the present traffic in the Ushigome-Yamagimachi area of 2000 cars/hr will result in a maximum of 10 ppm CO concentration, or an average of 2.6 ppm. But in the future, when the traffic may grow to the level of 10,000/hr, a maximum of 52 ppm with a 2 m/sec wind is expected.

27845

APTIC NO. 49556

Noguchi, Isamu, Minoru Takeda, Takumi Watanabe, and Hiroko Takeshita

THE RELATIONSHIP BETWEEN THE OCCURRENCE OF PHOTOCHEMICAL SMOG AND THE INITIAL CONCENTRATION OF OXIDANTS. (*Kokagaku sumogu no hassei to okishidanto shoki nodo no kankei*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 72. (Nov. 7-9, Paper 20.)

Of this year's 21 photochemical smog forecasts only 13 (62%) reached the level of actual warnings. The accuracy rate of the forecast on the preceding day was only 50%, largely due to the fluctuation of meteorological changes. But even the forecasts on the same day did not have a very high accuracy rate. The relationship between the actual smog and the initial concentration of oxidants was studied. On the days of concentrations of about 0.15 ppm that occurred between May and September 1971, the initial concentrations at 9 am at all points were around 0.06 ppm. The peaks appeared at 1 pm at four locations around the Tokyo Bay or center city, and at about 2 pm at four locations toward the western suburbs. High concentrations occurred at two locations in the western suburbs with a frequency of 32.9 and 40.2%, whereas high concentration occurred with relatively low frequency in central Tokyo. On days of low concentrations or less than 0.1 ppm maximum, the initial concentration early in the day was less than 0.05 ppm. The initial concentration of the day of maximum concentrations 0.10 and 0.14 ppm varied greatly, depending on the location. Therefore, the initial concentration of smog days was not always high. The meteorological factors seem to play important roles in the relationship between the initial concentration and the maximum concentration.

27846

APTIC NO. 49515

Nomoto, Hideyuki, Yasumasa Kumazawa, and Tsugio Mizoguchi

AN ANALYSIS OF HIGH OXIDANT CONCENTRATION IN OSAKA. (*Osaka no kisho joken to okishidanto nodo ni tsuite no kosatsu*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 76. (Nov. 7-9, Paper 24.)

The weather conditions and oxidant concentrations between June and Oct. 1971 in Osaka were studied. The weather between 9 am and 3 pm was divided according to the amount of sunshine into five classifications: Type 1, more than 50 ly/hr; type 2, more than 40-50 ly/hr; 3, more than 25-40 ly/hr; 4, 15-25 ly/hr; and 5, 0-15 ly/hr. The frequency of oxidant concentration in each category was examined. During the period

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mentioned above, oxidant concentrations of more than 0.1 ppm occurred 40 times on the days of Types 1, 2, and 3, and only eight times on the days of 4 and 5. Concentration of less than 0.1 ppm occurred 23 times on the days of Types 1, 2, and 3, and 21 times on the days 4 and 5. According to these results, relatively good weather (Types 1-3) brought more than 0.1 ppm pollution approximately 40% of the time, and only 10% occurred on less sunny and cloudy days. There were considerable monthly fluctuations for temperature, but between June and September, 80% of the days with more than 0.1 ppm oxidant concentration were between 24 and 33 C. Average humidity between 11 am and 3 pm was within the range of 40-90%. For weather Types 1 to 3, humidity ran between 55 and 60%, and approximately 80% of more than 0.1 ppm oxidant concentrations occurred within the 45-65% range.

27847

APTIC NO. 49975

Odaira, Toshio

PHOTOCHEMICAL SMOG IN TOKYO. Tokyo Metropolitan Environmental Protection, Research Inst. (Japan), Atmosphere Div., 78p., Nov. 1972. 34 refs.

Based on data on oxidants and other pollutants obtained at sampling stations in Tokyo and neighboring Prefectures, photochemical smog in Tokyo is a summer phenomenon. In the years 1967-1972, the average hourly value of oxidants exceeded 0.15 ppm on 106 days, 84% of which occurred in the months of May through August. The relationships between oxidant levels and ultraviolet radiation, wind direction and velocity, and atmospheric stability are discussed. Predictions of photochemical smog on the basis of relevant meteorological parameters are reviewed together with conditions for using the neutral buffered potassium iodide colorimetric method for continuous, automatic monitoring of oxidants or ozone. Daily changes in oxidant and nitrogen oxide levels on high oxidant days are shown. Results are reported of analyses of hydrocarbons in automobile fuels, engine exhausts, and air and of photochemical reaction products such as peroxyacetyl nitrates, formaldehyde, and particulates. The effects of photochemical smog on human health and plants in Tokyo are briefly described. Under the newly revised emergency action plan for photochemical smog, a photochemical smog warning is issued when oxidant concentration reaches 0.15 ppm, an alarm when it is 0.30 ppm or more, and an emergency alarm when it is 0.50 ppm or more. Since motor vehicle exhaust is the primary source of photochemical smog in Tokyo, stricter automobile emission standards are required.

27848

APTIC NO. 49387

Ooms, G.

A NEW METHOD FOR THE CALCULATION OF THE PLUME PATH OF GASES EMITTED BY A STACK. *Atmos. Environ.*, 6(12):899-909, Dec. 1972. 21 refs.

A new method was developed for the calculation of the plume path of stack gases emitted into an atmosphere with wind and was compared with the results of wind tunnel experiments and experimental results in the literature. The Boussinesq assumption was eliminated, but entrainment and the drag force were realistically described. The zone of flow establishment and turbulence and stratification of the atmosphere were incorporated into the model. (Author abstract modified)

27849

APTIC NO. 49126

Outcalt, Sam I.

A RECONNAISSANCE EXPERIMENT IN MAPPING AND MODELING THE EFFECT OF LAND USE ON URBAN THERMAL REGIONS. *J. Meteorol.*, 11(8):1369-1373, Dec. 1972. 7 refs.

A simple digital simulator was modified for the simulation of land-use-dependent surface thermal contrast in urban terrain. The simulations were tested using thermal maps over an urban area sampled to assign mean temperatures to four blocks: far-

mland, city center, new subdivisions, and old residential. The relative thermal rank was correctly evaluated by the simulator at the test periods, and the largest relative simulation error was only 13% of the diurnal thermal range at these times. (Author abstract modified)

27850

APTIC NO. 49197

Oya, Fumihiko, Shogo Ochiai, Nobuaki Kadoya, Hiroshi Yanaka, and Kazuo Aihara

PHOTOCHEMICAL AIR POLLUTION IN KANAGAWA (NO. 2). METEOROLOGICAL FACTORS OF PHOTOCHEMICAL AIR POLLUTION. (*Kanagawa-ken ni okeru kokagaku kogai ni tsuite (dainiho), kokagaku higai hasseiji no kisho joken ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 78. (Nov. 7-9, Paper 26.)

The meteorological factors causing high oxidant concentrations in the Kanagawa area are as follows: visibility at 9 am is approximately 4 km or less and hazy; the wind velocity at the origin is less than 3-4 m/sec; sunny or slightly cloudy during the day; the maximum temperature is higher than 25 C and the rise is drastic; humidity is high in the morning; atmospheric stability is at less than 1500 m, and the wind is less than 5 m/sec; an inversion layer exists at about 1000 m altitude, or if not, a strong stability existed about 9 pm on the previous night; the greater the inversion layer, the greater the degree of pollution seems. The mid-rainy season or the end of the rainy season type of air pressure, or strong mid-summer type of pressure cause pollution. When a stagnant area exists along the sea breeze front, a high oxidant concentration seems to occur. Geographically, frequent occurrence is recognized along the Tama river, part of Yokohama city, and the northern part of the Miura Peninsula. Towns, valleys, and basins away from the shoreline and from the main highways often have high concentration of oxidants.

27851

APTIC NO. 49418

Radchenko, I. S. and P. P. Safonenko

THE SPECTRAL POSITION AND SHAPE OF THE ATMOSPHERIC ATTENUATION CURVE AS AFFECTED BY THE SHAPE AND ORIENTATION OF THE ATMOSPHERIC DUST PARTICLES. (*Vliyanie formy i orientatsii pylevykh chastits v atmosfere na spektral'noye polozheniye i formu polosy oslableniya*). Text in Russian. Izv. Akad. Nauk SSR, Fiz. Atmosfery i Okeana, 8(12):1322-1326, 1972. 4 refs.

The effect of the shape and orientation of dust particles on the spectral position and shape of the attenuation band was studied on iron dust as model substance. Separation and shift of the maxima of the attenuation factors during attenuation of radiation by oriented ellipsoids of revolution was determined. The attenuation factor for radiation with electric vectors parallel to the minor axis of oriented ellipsoids of revolution shifted toward the short-wave section of the spectrum, while the attenuation factor for radiation with electric vectors parallel to the major axis of oriented ellipsoids of revolution shifted toward the long-wave section, with the magnitude of the shift being dependent on the degree of anisometricity of the particles. The second attenuation factor is larger in absolute value than the first one, which indicates that a minor proportion of oriented anisometric particles is sufficient for the absorption in the infrared spectral range to exceed attenuation in the ultraviolet and violet ranges.

27852

APTIC NO. 49419

Shinya, Kozo

THREE DIMENSIONAL SURVEY OF REGIONAL AIR POLLUTION. (*Koiki taiki osen no rittai chosa ni tsuite*). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 16:53-58, Dec. 1972.

A three-dimensional air pollution survey was conducted for 6 days over the Tokyo Bay area from the end of Jan. to the beginning of Feb. 1972 as a preliminary survey for a summer photochemical smog survey. Airplanes mounted with radar, an electric wave altitude meter, a continuous lit camera, a crystal clock, a correlation spectrometer, and a nephelometer were flown once a day from 11 am to 1 pm to measure nitrogen dioxide, sulfur dioxide, and aerosols at certain altitudes. Clear concentration patterns were found for NO₂, depending on winds, however it was difficult to determine clear patterns of SO₂ concentrations, possibly due to measurement errors. Above 1000 m, aerosols ranged from 30-50 micrograms/cu m in concentration. Vertical aerosol distribution was varied at the lower altitudes. In the winter, the wind direction remained steady, so the pollutant distributions were simple to determine. In the summer, the wind blows from the sea to the land in the coastal area during the day, and from land to sea at night, so distributions are more complex. Winds affect the dispersion of pollutants over industrial areas of Japan which are in the coastal belt. In the winter, 70% of the winds are northerly; in the summer, 70% are southerly.

27853

APTIC NO. 49557

Shiozawa, Kiyoshige, Atsushi Otaki, Shinichi Okamoto, Junichi Yamane, and Jun Hiroo

STUDIES ON THE PREDICTION OF AIR POLLUTANT CONCENTRATION. III - GEOGRAPHICAL DIFFERENTIALS OF STATISTICAL FORECASTING. (*Taiki osen busshitsu nodo no yosoku ni kansuru kenkyu. III - Tokeiteki yosoku ni kansuru chikisa ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut. 13th, 1972, p. 288. (Nov. 7-9, Paper 242.)

The regression coefficient idiosyncracies of each monitoring point were examined, and the forecasting accuracy of pollution by regression models was checked. The method used was the general overlapping regression analysis, factors checked were maximum temperature, temperature gradient, average wind velocity, maximum wind velocity, wind direction, weather, rain quantity, sunlight quantity, temperature distribution, and atmospheric pressure. The data used were 1969 pollution measurement data omitting the data from the first three months, and weather factor data obtained from the Tokyo Metropolitan Weather Observatory. The sulfur dioxide concentration was predicted for 10 locations in Tokyo, four locations in Saitama Prefecture, eight locations in Kanagawa Prefecture, and 16 locations in Chiba Prefecture. The weather factors showed poor correlations among Ichihara, Anegasaki, Yokohama and Central Tokyo, and high multiple correlation in north Kawasaki and Saitama Prefecture. The pressure map showed high correlations in Tokyo, Kawasaki, and Western Chiba; the correlations decreased as distance increased into suburban areas.

27854

APTIC NO. 49185

Sueda, Shintaro, Kenichi Shimohara, Yukio Eguchi, Nobuyasu Shigemori, and Takashi Akiyama

FLUORIDE AND SULFATE CONCENTRATION IN THE ATMOSPHERE OF KITA-KYUSHU CITY. (*Kita-Kyushu shi ni okeru taiki-chu fusso oyobi ryusankon no bunpu*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 187. (Nov. 7-9, Paper 142.)

Thirty-two monitoring stations were installed in Kita-Kyushu in June 1971, and the measurements of fluorides and sulfates, and the distribution changes were observed. Settling particles and rain water collected in deposit gauges were filtered, and the solution was distilled. The lanthanum-alizarin-complexion method was used for fluorides and nephelometry was used for sulfate determinations. Sulfur dioxide measurements were taken by the lead dioxide method. The sulfate distribution was high along the Dokai Bay and agreed with the distribution pat-

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tern of SO₂ gas. Fluorides showed a similar distribution pattern, but the concentration was especially high in the Kokura industrial area. In northern Moji, sulfate was low but fluoride concentration was high. Sulfate concentration was high in June and February and low in July, August, and Oct. The SO₂ fluctuations were similar. Fluoride count was low only in Oct.

27855

APTIC NO. 49124

Tanizawa, Heihachiro, Yuji Watanabe, and Jun Omagari
STATISTICAL INFERENCE IN FREQUENCY DISTRIBUTION MODEL FOR AIR POLLUTION AREA. (NO. 3). (*Chiiki o sen to tokeiteki keitai ni tsuite (daisanpo)*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 191. (Nov. 7-9, Paper 146.)

The data from the past five years on sulfur oxides concentration monitored at five locations of Sapporo were examined to analyze the seasonal transition and daily fluctuation patterns of air pollution types in the city. In Sapporo, the daily fluctuation pattern of pollution clearly reflected the conditions of heating systems, both domestic and business types. However, in suburban areas where health centers are located, other factors such as wind direction and wind velocity, and conditions of nearby emission sources played a more important role in the fluctuation pattern. The correlations between pollution fluctuations at various points and sulfur oxides are presented in graphs.

27856

APTIC NO. 49272

Tiefenau, H. and P. Fabian

THE SPECIFIC OZONE DESTRUCTION AT THE OCEAN SURFACE AND ITS DEPENDENCE ON HORIZONTAL WIND VELOCITY FROM PROFILE MEASUREMENTS. *Arch. Meteorol. Geophys. Bioklimatol. Ser. A (Vienna)*, 21(4): 399-412, 1972. 13 refs.

The ozone destruction rate at the ocean surface was estimated from profile measurements between 1 and 20 m above the open sea. The ozone concentration gradient was independent of the horizontal wind velocity within the instrumental error range. Within the velocity interval of 1 m/sec to 10 m/sec, a mean gradient of 0.23 ± 0.12 gamma/m for stable stratification and of 0.09 ± 0.018 gamma/m for unstable stratification were obtained. Both values were based upon an assumed ozone concentration of 100 gamma at a 25-meter altitude. Thus, the vertical flux of ozone and the specific ozone destruction rate of the ocean surface were proportional to the wind velocity. Between the specific ozone destruction rate and the average wind velocity at 10 m height the following relation held: ozone destruction rate equaled 1.7 ± 0.6 times 10 to the -5 power times the average wind velocity in cm/sec. Above 30 m, the results of balloon soundings indicated the mixing ratio of ozone/air to be constant with altitude.

27857

APTIC NO. 49097

Tsang, Gee

STACK EXIT VELOCITY DISTRIBUTION FOR HIGHER EFFECTIVE STACK HEIGHT. *Atmos. Environ.*, 6(11):815-828, Nov. 1972. 2 refs.

The effective height of a smoke stack can be increased by better preserving the temperature and velocity of the flue gases, which in turn, can be achieved by minimizing the entrainment of the cold ambient air into the plume. Based on the entrainment hypothesis, the optimal velocity distribution at the stack exit and the optimal size of the stack exit for minimum ambient entrainment were derived. Laboratory experiments were performed to compare the ability of rising across an inversion by a plume from a conventional stack and by a plume from a stack designed according to the new theory. Qualitative experiments showed that under identical atmospheric conditions, while the plume from the new stack penetrated across the inversion, the plume from the conventional stack would be

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trapped by it. Based on the theory, devices can be built and installed on the top of industrial chimneys to eject the effluents to a higher altitude. The present study was for a neutral and calm atmosphere only. Parallel studies on two-dimensional plumes were also made. (Author abstract)

27858

APTIC NO. 49777

Turner, D. Bruce

AIR QUALITY FREQUENCY DISTRIBUTIONS FROM DISPERSION MODELS COMPARED WITH MEASUREMENTS. Preprint, 35p., 1972. 5 refs. (Presented at the Symposium on Statistical Aspects of Air Quality Data, Chapel Hill, N. C., Nov. 9-10, 1972.)

Cumulative frequency distributions estimated from short term dispersion models were compared with those determined from measurements for the same locations, periods of record, and averaging times. Maximum values were also compared. Meteorological information typically consisted of wind speed and direction, atmospheric stability class, and mixing height or temperature variation with height. Emission data included emission rates for point and area sources and stack parameter data. The maximum 24-hour sulfur dioxide concentration estimated by the model during an 89-day period was within a factor of two of the measured maximum at 35 or 40 sampling stations in St. Louis, Mo. The maximum 2-hour SO₂ concentration estimated during the same period of record was within a factor of two of the measured 2-hour maximum at all 10 sampling stations with 2-hour measurements available. (Author abstract modified)

27859

APTIC NO. 49812

Turner, D. Bruce, John R. Zimmerman, and Adrian D. Busse

AN EVALUATION OF SOME CLIMATOLOGICAL DISPERSION MODELS. Preprint, North American Treaty Organization, 25p., 1972. 15 refs. (Presented at the North American Treaty Organization, Committee on the Challenges of Modern Society, Panel on Modeling Meeting, 3rd, Paris, France, Oct. 2-4, 1972.)

Six different dispersion models were used in a climatological mode of application with point source and area emission data to calculate annual sulfur dioxide and total suspended particulate matter for the New York Air Quality Control Region for 1969. The Air Quality Display Model (AQDM) and the Climatological Dispersion Model (CDM) used joint frequency distributions of wind speed and direction and stability class as meteorological data. The Climatological Dispersion Model (single stability) required only a wind direction frequency and harmonic mean speed for each direction. The other three models, the Gifford 72, Modified Hanna, and Modified Hanna Including Source Height, required only mean annual wind speeds for climatological application. The simple models were as highly correlated with measurements as the more complex models, explaining 70% of the SO₂ variance and 40% of the particulate variance. For SO₂, root mean square errors for the best complex model were 52; those for the simple models were 56-59. The standard deviation of the measurements was 72. For particulates, root mean square errors for the complex model were 16; those for the simple models were 19-40. The standard deviation of the measurements was 23. Of the two more complex models, the CDM yielded smaller errors with means and maxima nearer to those of the measurements. (Author abstract modified)

27860

APTIC NO. 49566

Vogl, J.

SUPERVISION AND MEASUREMENT OF SULFUR DIOXIDE CONCENTRATIONS IN THE REFINERY CENTER INGOLSTADT-NEUSTADT DURING THE YEARS 1965 TO 1970. (*Ergebnisse der Ueberwachung der Schwefeldioxidimmission im Raffineriezentrum Ingolstadt-Neustadt mit Hilfe kontinuierlich registrierender Messstationen in den Jahren 1965 bis 1970*). Text in Ger-

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man. Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA, Basel, Switzerland, 1971, p. 257-267, 1972.

In Ingolstadt-Neustadt, large amounts of sulfur dioxide are emitted by petroleum refineries and power plants. To make sure maximum allowable concentrations are never exceeded, even when meteorological conditions are adverse to exchanges between the different air layers, industries were ordered to reduce SO₂ emissions gradually during unfavorable weather conditions. A system of 10 local SO₂ monitoring stations was set up in 1964. During the winter months the influence of domestic heating emissions in Ingolstadt almost counterbalances the influence of power plant SO₂ emissions on ground-level SO₂ concentrations. Monthly and yearly SO₂ concentrations are given, and the effects of wind, temperature, and stability are discussed.

27861

APTIC NO. 49541

Weise, E.

MODEL FOR CONTROLLING THE QUANTITATIVE FLOW OF MATTER EFFECTING THE ENVIRONMENT, DEMONSTRATED WITH THE ELEMENT MERCURY. (Modell zur Kontrolle des Mengenflusses von umweltrelevanten Stoffen am Beispiel des Elements Quecksilber). Text in German. Wasser Luft Betrieb, 16(11):394-395, 1972.

A model for studying the quantitative flow of readily detectable, environmentally relevant inorganic matter in the environment is proposed. Based on the quantitative constancy of the elements in the upper strata of the earth, this model arrives at a balance of the material flow occurring in a given period and in a given country. The factors determining the gain and loss in the material balance for a given element are influxes due to import and rivers and other carriers from other countries, natural resources, industrial production, recycling and spontaneous and controlled redistribution inside the country, as well as outflow due to export and spontaneous carry-away.

27862

APTIC NO. 49311

Yutani, Satoshi

PRELIMINARY ANALYSIS OF SPACE AND TIME DISTRIBUTION OF OXIDANTS IN OSAKA. (Osaka chiiki ni okeru konodo okishidanto hassei yoin no ni-san no kaiseki). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 306. (Nov. 7-9, Paper 34.)

Among the factors contributing toward the formation of photochemical smog, data concerning characteristics of the ground temperature, wind direction, wind velocity, and their local distribution patterns were analyzed and classified. The data collected in July 1972 by the Osaka Prefectural Pollution Monitoring Center continuous monitoring network was used. Five rainy days were eliminated, and the average oxidant concentrations at 1-2 pm from 15 locations were used. The correlations between days were obtained and classified by type. The direct vari-max method was used for classification. But the classification by type was not clear and the data was not sufficient. The daily oxidant concentration distribution showed high correlations. In addition to characteristics of each type, there were many common characteristics applicable to all, and this prevented a clear application of the vari-max method. Reexamination of the structure of data is required.

1971

27863

APTIC NO. 49463

Nicolet, M.

PHOTOCHEMISTRY OF OZONE IN THE STRATOSPHERE UNDER THE INFLUENCE OF NITROGEN OXIDES AND HYDROGEN COMPOUNDS. (Photochimie de l'ozone dans la stratosphere sous l'action

des oxydes d'azote et des composés de l'hydrogene). Text in French. Aeron. Acta A, no. 89: 1-28, 1971. 35 refs.

NTIS: N72 14383

The influence of nitrogen oxides and hydrogen compounds on the stratospheric ozone formation was studied by artificial injection of such constituents into the stratosphere. There is practically no direct action on the ozone molecules, since all reactions involve atomic oxygen in photochemical equilibrium with ozone. Catalytic destruction of ozone by water vapor occurs through reactions of hydroxyl and peroxide radicals produced in the oxidation of water by excited oxygen atoms, O(1D). With mixing ratios greater than 3 ppm, water vapor represents a significant ozone-destroying agent in the upper stratosphere. The catalytic destruction by NO_x requires a concentration of nitrogen dioxide molecules greater than 1,000,000,000/cu cm above 25 km. Injection of water vapor and of NO₂ at stratospheric levels will have a controlling effect on the ozone concentrations in the upper stratosphere if it leads to mixing ratios greater than 3 ppm and 3 ppb for H₂O and NO₂, respectively. For the lower stratosphere below 25 km, dynamic considerations must be introduced since there is a complete departure from photochemical equilibrium conditions. The transfer of NO_x from the stratosphere into the troposphere is accompanied by its conversion into nitric acid. It is not possible to evaluate the volume of the material transport from the troposphere into the stratosphere.

1970

27864

APTIC NO. 49823

Bolin, Bert and Walter Bischof

VARIATIONS OF THE CARBON DIOXIDE CONTENT OF THE ATMOSPHERE IN THE NORTHERN HEMISPHERE. Tellus (Uppsala), 22(4):431-442, 1970. 23 refs.

A long-term sampling program was initiated to determine the variations of carbon dioxide content in the troposphere and lower stratosphere of the northern hemisphere. Over 1963-1968, an average annual increase of 0.7 + or 0.1 ppm was determined, while annual industrial output increased from 1.9 to 2.3 ppm/yr. The implications with respect to vegetative assimilation, net transfer to the oceans, transfer rate across sea surfaces, and increase in fossil fuel combustion were considered. The amplitude of the seasonal variation was about 6.5 ppm at 2 km and 3.5 ppm in the uppermost part of the troposphere. The phase shift of the seasonal variation between these two levels was 25-30 days. A vertical eddy diffusivity was derived on this basis and established as K equals 20,000 cm sq/sec. The amplitude of the seasonal variation in the lower stratosphere (11-12 km) was less than 1 ppm and the phase was delayed at least 1.5 months as compared with the upper troposphere. (Author abstract modified)

1964

27865

APTIC NO. 49635

Fleming, Guenther

METEOROLOGICAL DATA CONCERNING SMOKE DAMAGE IN THE FOREST AREA OF THE ERZGEBIRGE RIDGE. Wiss. Z. Tech. Univ. Dresden, 13(5):1531-1537, 1964. 48 refs. Translated from German, 29p.

The principal meteorological factors in smoke dispersion -- winds and turbulence -- were represented in the smoke supply effect at the ridge of the Erzgebirge. At first, an above average stable air layer resulted, but this stability diminished at the southeastern slope of the Erzgebirge through dynamic and thermic influences. The effect on smoke dispersion of forest boundaries and smoke protection obstacles is discussed. Climatic elements which influence the processes of smoke damage and the productivity of smoke particles in fog and freezing fog are reviewed.

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1973

27866

APTIC NO. 49785

Bufalini, Joseph J. and William A. Lonneman

PHOTOCHEMISTRY OF ATMOSPHERIC SAMPLES IN NEW YORK. Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 9p., 1973 (?). 17 refs.

The photochemical effect of added nitric oxide and sulfur dioxide to air samples collected in the ambient air and at the Lincoln Tunnel entrance in New York City was investigated. The hydrocarbons were, for the most part, representative of the auto exhaust gases in the area. The instrumentation and analytical techniques are reviewed. The time required to reach the nitrogen dioxide maximum increased with the addition of NO. Maximum ozone concentration, however, was relatively insensitive to nitrogen oxide concentration. Aromatic hydrocarbons were also unaffected by NO addition. The addition of SO₂ had no obvious effect on either the hydrocarbon reactivity, NO₂ maximum, or oxidant formation.

27867

APTIC NO. 49769

Hoellerer, G. and J. Hoffmann

DETERMINATION OF MERCURY-TRACES IN BIOLOGICAL MATERIALS. (*Quecksilber-Spurenbestimmung in biologischem Material*). Text in German. Z. Lebensm.-Unters. Forsch. (Munich), 150(5):277-280, 1973. 2 refs.

An atomic absorption spectrophotometric method for determining mercury traces in biological materials such as hair, meat, fish, and fingernails is discussed which is especially suitable for routine examinations because of its utensils and labor input. The detection limit is 25 ng/g; therefore the range of 0.05 mg/kg which is especially interesting for environmental problems, can be detected in biological materials without any concentration. The method was tested in the field.

27868

APTIC NO. 49229

Horstman, Stanford, William Barkley, Edwin Larson, and Eula Bingham

AEROSOLS OF LEAD, NICKEL, AND CADMIUM. Arch. Environ. Health, 26(2):75-77, Feb. 1973. 8 refs.

An aerosol generator for the production of soluble and insoluble nickel, lead, and cadmium aerosols was developed. Water soluble aerosols with mass median diameters of 0.19 and 0.30 micron, respectively, were generated from solutions of lead chloride and nickel chloride by means of a nebulizer head fabricated from a 22 gage stainless steel hypodermic needle and operated with filtered air at 11 to 18 psi. The lead chloride and nickel chloride concentrations in the respective solutions were 0.5 and 1.0 mg/l. Aerosols of nickel oxide and cadmium oxide were produced by aerosolizing aqueous solutions of nickel citrate or cadmium acetate with air and then thermally decomposing the resulting aerosol in a tube furnace heated to 600 C. The resulting aerosols of NiO and CdO had mass median diameters of 0.24 and 0.15 micron, respectively. The use of a nebulizer with soluble salts of metals followed by thermal decomposition and oxidation to form the required oxide provides a simple, easily controlled, and flexible system for the generation of aerosols of metal oxides.

27869

APTIC NO. 49299

Kato, Tsutomu, Shinjiro Watari, and Hideaki Honda

MANUFACTURING METHOD OF SPHERICAL ACTIVE CARBON. (*Kyukei kasseitan no seizohoho*). Text in Japanese. (Ministry of International Trade and Industry, Tokyo (Japan), Agency of Industrial Science and Technology) Japan. Pat. Sho 48-3076. 5p., Jan. 29, 1973. (Appl. June 13, 1969, 1 claim).

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Spherical active carbon can be manufactured by adding a caking agent and water to fine coal of 1100-mesh or smaller grain size, by mixing these ingredients, by kneading and processing the mixture to manufacture spherical coal, by heating the coal to 400-700 C, and by processing it for activation at 650-1000 C using steam or an oxidizing gas as the activating agent. Ash is removed from the coal before the coal is activated to prevent uneven activation and catalyst poisoning.

27870

APTIC NO. 49300

Ono, Koichi, Futomi Matsumoto, Hidehiro Ise, Masatoshi Wada, and Hiroshi Yonei

MANUFACTURING METHOD OF A GLOBULAR CARBONIC CATALYST CARRIER. (*Tansokei kyujo shokubai tantai no seizoho*). Text in Japanese. (Nittetsu Mining Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-3074. 3p., Jan. 29, 1973. (Appl. April 30, 1969, 1 claim).

A manufacturing method is described to manufacture globular catalyst carriers featuring greater mechanical strength and specific surface area than previous catalysts. The method consists of adding a binder material to the carbon material, manufacturing granules from this mixture, drying the granules at 80 C or lower, processing the granules for dry distillation performed by gradual heating, and carbonizing at 600-900 C. The catalyst carrier produced has high thermal stability and heat-conductivity, greater porosity and surface area, high stability, and greater mechanical strength.

27871

APTIC NO. 49222

Spicer, Chester W., Alberto Villa, H. A. Wiebe, and Julian Heicklen

REACTIONS OF METHYLPEROXY RADICALS WITH NITRIC OXIDE AND NITROGEN DIOXIDE. J. Am. Chem. Soc., 95(1):13-20, Jan. 10, 1973. 6 refs.

The photooxidation of azomethane (CH₃N₂CH₃) was studied at 25 C in the presence of nitric oxide and nitrogen dioxide. The reaction conditions were (CH₃N₂CH₃) from 1.6 to 29.1 torr, oxygen from 2.3 to 30.7 torr, iodine from 0.024 to 0.56 micron/sec, and NO from 19 to 91 micron or NO₂ from 31 to 142 micron. In most runs about 100 torr of nitrogen was also present. Both 14N and 15N isotopes were used in the NO and NO₂, and the product peaks were monitored by mass spectrometry. Some runs were also analyzed by gas chromatography. With either NO or NO₂ the major product of the reaction was CH₃ONO₂, though it appeared with an induction period in the NO studies. Also, HCOOH was produced with an induction period in both studies. Its presence strongly interferes the production of CH₂O as a primary product.

1972

27872

APTIC NO. 49953

Berghlund, Richard Newman

BASIC AEROSOL STANDARDS AND OPTICAL MEASUREMENTS OF AEROSOL PARTICLES. Minnesota Univ., Minneapolis, Dept. of Mechanical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1972, 258p. 65 refs.

A basic aerosol standard was developed, and the optical measurement of aerosol particles was studied. The basic aerosol standard, a vibrating orifice monodisperse aerosol generator based upon a uniform break-up of a liquid jet, has a high degree of monodispersity, accurately known particle size, and should be sufficiently flexible to generate aerosols from a wide variety of solids and liquids. The liquid jet fed into the droplet generator is disturbed at a constant frequency with an oscillating piezoelectric ceramic and breaks up into uniform droplets which later are dispersed by a turbulent air jet into a monodisperse aerosol. The particle diameter varies from 0.5 to 30 micron and can be calculated with less than 1% error from the generator operating conditions. The concentration variation

is less than 3%. The response versus particle diameter was theoretically predicted for several optical particle counters for both transparent and absorbing spherical particles with refractive indices ranging from 1.2 to 2.4 and 1.50-0.021 to 2.0-1 respectively. Experimentally determined response curves of the Bausch and Lomb 40-1 optical particle counter agreed with the theoretical response curves.

27873

APTIC NO. 49413

Burova, L. G., A. D. Kokurin, and G. I. Yemchenko

INVESTIGATION OF THE PYROLYSIS OF AROMATIC HYDROCARBONS. (*Issledovaniye protsessa piroliza aromaticheskikh uglevodorodov*). Text in Russian. *Zh. Prikl. Khim.*, 45(10):2286-2290, 1972. 7 refs.

The pyrolysis of benzene, styrene, and styrene-hydrogen in the presence of water vapor and in a temperature range of 700-1000 C was studied. Conversion of benzene into diphenyl in a temperature range up to 900 C was observed. At the same time, part of the benzene molecules decomposed to form acetylene which later formed styrene and naphthalene in a reaction with benzene. The styrene and naphthalene thus obtained formed aromatic polycyclic hydrocarbons of higher molecular weight, such as pyrene, phenanthrene, and methane due to their condensation with benzene and acetylene. Pyrolysates from styrene and styrene-hydrogen contained no diphenyl, but did contain methyl-naphthalene, stilbene, and fluorene. The formation of ethylene was due to a considerable extent, to the hydration and fission of vinyl groups from aromatic compounds, and to partial hydration of acetylene.

27874

APTIC NO. 49461

Chung, Tai-Soo

THE PERMEATION OF HYDROCARBON GASES THROUGH POLYMER MEMBRANES. *State Univ. of New York, Buffalo, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Jan. 1972, 123p. 54 refs.*

The permeation of propane and ethylene through polyethylene was studied. In the temperature range from -10 C to 20 C and the pressure range from 44.7 psia to 64.7 psia, facilitated transport was observed in the permeation of propane through polyethylene, while it was not observable in the permeation through Saran. In the former case the flux exhibited a minimum about 10 deg above the condensation temperature and increased as temperature decreased. This phenomenon is very similar to that observed in the permeation of propylene through polyethylene and methyl bromide through polyethylene. It is confirmed that the permeation of hydrocarbon gases through a polyethylene membrane in the pre-condensation region exhibits most of major characteristics of facilitated transport. The permeation of ethylene through polyethylene manifested more normal permeation behavior, but its permeability did depend on the upstream pressure. The temperature and pressure range used for ethylene, the same as used for propane, was far above the pre-condensation region of ethylene vapor. There exists a noticeable plasticization in the permeation of hydrocarbon gases through polymers. Existing solubility data were consistent with a binary clustering tendency for the systems of propane in polyethylene and propylene in polyethylene. Two models; a binary clustering model, and a concentration dependent diffusion model, were developed for the facilitated transport in the permeation of hydrocarbon gases through a polymer. The predicted permeability coefficients in general fit the experimental data to within an order of magnitude, but neither model was wholly successful. The major inadequacy of the clustering model originated from its purely local description of the plasticizing. There is presumably an overall plasticizing effect of sorbed molecules. The predictability of the phenomenon can be probably improved by combining the two models.

27875

APTIC NO. 49876

Fissan, H. J., D. B. Kittelson, and K. T. Whitby

MEASUREMENTS OF AEROSOLS PRODUCED BY A PROPANE-AIR FLAME IN A CONTROLLED ENVIRONMENT. *Minnesota Univ., Minneapolis, Particle Technology Lab., Air Pollution Control Office Research Grant AP00136-11 (now R-801175), PLP-190 44p., Aug. 1972. 6 refs.*

Both premixed and diffusion laminar propane/air flames were burned in a controlled environment. The effects of combustion air, flow rate, humidity, oxidation ratio, and fuel flow rate on particle concentration and size were studied. The exhaust gases were cooled, diluted, and passed through an aerosol charge neutralizer. A condensation nuclei counter and Whitby aerosol analyzer were used to determine the concentration and size distributions of resulting aerosols. The most important parameter controlling the production of particles was the humidity ratio in the system above the flame. For example, under typical conditions as the humidity ratio was varied from 0.007 to 0.014, the measured particle concentration varied from near 0 to approximately 100,000 particles/cu cm. Fuel flow rate and oxidation ratio were of secondary importance. The particles produced were very small, with a median diameter of about 25 A for a total humidity ratio of approximately 0.014. Although no direct measurement could be made for lower humidity ratios, particle sizes seemed to become even smaller as the total humidity ratio decreased. Experiments comparing aerosols produced by flames burning in filtered and unfiltered air indicated that a synergistic effect exists, resulting in the production of many more fine particles (diameter less than 100 A), as well as about a 50% increase in total aerosol volume in the case of the flame burning in unfiltered air. (Author abstract modified)

27876

APTIC NO. 49083

Khouri, Fouad and D. B. Robinson

A CHROMATOGRAPHIC STUDY OF VAPOR-LIQUID EQUILIBRIA IN THE METHANE-CARBON DIOXIDE-N-OCTANE SYSTEM. *J. Chromatographic Sci.*, 10(11):683-690, Nov. 1972. 14 refs.

Vapor-liquid equilibrium constants were measured for methane and carbon dioxide in the methane-carbon dioxide-n-octane system, using the gas-liquid chromatography method. Measurements were made for a vapor composition of 0.4136 mole fraction methane at -40, -20, 0, and 20 C, and at pressures to 1000 psia. A multiple sample injection technique was employed, along with simultaneous detection of radioactive and concentration signals. Perturbation of the gas components concentration was also studied, as another means for determining the equilibrium constants. Helium retention time was used for eliminating the effect of the free gas volume. (Author abstract)

27877

APTIC NO. 49279

Matsushita, Sukaku, Keiichi Arashitani, and Michiko Koyano

ANALYSIS OF CARCINOGENIC POLYNUCLEAR HYDROCARBONS IN COMMERCIAL GASOLINES. (*Shihan gasorin chu no hatsugan sei takan hokozoku tankasuiso no bunseki*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 116. (Nov. 7-9, Paper 71.)

Eight types of regular gasoline and eight octane gasolines were analyzed, and their polynuclear aromatic hydrocarbons were measured. Thin-layer chromatography was used in separating polynuclear hydrocarbons, and solutions were separated and components identified by fluorescence. First the material was examined by spectrophotometry to see if it was made of a single element or composite elements. If it was a single element, the spectrum was compared with the standard material and identified; when it was a composite, excitation and fluorescence were applied, and a closeup spectrum of each element was obtained. The measurements were taken by the

Narrow Base Line method. There were 10 identifiable elements: benzo(a)pyrene, benzo(b)fluoranthene, anthantholene, chrysene, benzo(k)fluoranthene, benzo(a)anthracene, perylene, fluoranthene, pyrene, and benzo(ghi)perylene. More polynuclear aromatic hydrocarbons were found in high octane gasolines than in regular.

27878

APTIC NO. 49530

Nakadoi, Takashi, Ryoko Nakamura, and Michio Oka

PHOTOCHEMICAL REACTION PRODUCTS OF AIR POLLUTANTS. (*Kokagaku hanna seiseibutsu ni suite*).

Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 54. (Nov. 7-9, Paper 2.)

Hydrocarbons, nitrogen oxides, and sulfur dioxide were made to react to each other in the presence of the air in a small chamber, and by photochemical reactions, aldehydes, nitrates, and peroxyacetyl nitrates were produced. The components were analyzed by the infrared spectrometry and gas chromatography (flame ionization detector and ECD). A 200 W high pressure mercury lamp encased in a pyrex glass tube was placed in the center of the chamber. Hydrocarbons were n-butane, ethylene, trans-2-butene, 1,3-butadiene, and toluene. The irradiation time was between 6 and 20 hr. The reaction between trans-2-butene (250 ppm) and NOx (300 ppm) formed acetaldehyde, and four other elements, and caused a slight absorption of PAN at 8.6 micron infrared. The reaction of trans-2-butene (600 ppm), NOx (192 ppm), and SO₂ (150 ppm) produced entirely foreign elements other than acetaldehyde or ethyl alcohol. When the ratio of concentration was changed for toluene and NOx, no clear reaction pattern could be obtained either on gas chromatography or on infrared spectrum.

27879

APTIC NO. 49261

Pratt, David T., Barry R. Bowman, Robert J. Robertus, and Clayton T. Crowe

COMPARISON OF FOUR SIMPLE MODELS OF STEADY FLOW COMBUSTION OF PYROLYZED METHANE AND AIR. *Combust. Sci. Technol.*, 6(3):187-190, Nov. 1972. 15 refs.

Four chemical reactor models to predict nitric oxide formation in the primary zone of a steady flow combustion system were calculated and compared. Calculations in the simple plug flow model, completely segregated perfectly stirred reactor (PSR) model, micro-mixed perfectly stirred reactor model, and two-environment model were performed for adiabatic steady flow combustion of a carbon monoxide/hydrogen/air mixture, representing pyrolyzed methane and air in stoichiometric proportions. Of the models studied, only the PSR and two-environment models predicted stable combustion at all inlet conditions for which combustion in fact occurred. The two-environment model included arbitrary residence time distributions and finite mixing rates and predicted stable combustion over a realistic range of inlet conditions. (Author conclusions modified)

27880

APTIC NO. 49943

Rehak, Viktor, Igor Cepciansky, and Frantisek Novak

SIMPLE PHOTOCHEMICAL REACTORS FOR THE QUALITATIVE MONITORING OF PHOTOCHEMICAL REACTIONS. (*Experimentální technika fotochemie I. Jednoduché fotochemické reaktory pro kvalitativní sledování fotochemických reakcí*). Text in Czech. *Chem. Listy*, 66(5):551-553, May 1972. 3 refs.

The construction and operation of simple finger, drum, and cell photoreactors are described. The finger photoreactor consists of a light source immersed in the photolyzed solution in a silica finger. The drum photoreactor consists of a source of light located in the center of a reflex drum with photolyzed samples fastened around its perimeter. The cell photoreactor consists of a light source whose radiation is optically channelled

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into a parallel beam, an optical filter, and a cell with the sample to be analyzed. The first two types are best suited for the monitoring of intermediary and reaction products of photochemical reactions. The cell photoreactor is suited for quantitative measurements and for the measurement of spectral changes of the photolyte during irradiation. The instruments provide for effective irradiation of the photolyte, for photolysis in an inert atmosphere or in the atmosphere of the gas participating in the reaction, for sample taking at any time without altering of experimental conditions, and for irradiation of the photolyte with monochromatic light.

27881

APTIC NO. 49806

Veremyev, Ye. S., V. V. Kislykh, and A. Ye. Sidelnikov

STUDY ON NITROUS OXIDE DECOMPOSITION UNDER 1500-2500 ATM PRESSURE. (*Issledovaniye razlozheniya zakisi azota pri davleniyakh 1500-2500 atm*). Text in Russian. *Kinetika i Kataliz*, 13(2):269-273, 1972. 18 refs.

Pressure-induced thermal decomposition of nitrous oxide in nitrogen gas in an adiabatic pressurized chamber was studied in a pressure range of 1500-2500 atm. The initial N₂O concentration was 0.00362 mol/cu cm. The decomposition of N₂O may lead to the formation of nascent oxygen which may combine to molecular oxygen in reactions with N₂O. Quantitative decomposition of N₂O was determined. The rate constant of the decomposition reaction of N₂O into N₂ and O was 140,000,000,000 exp(-52,800/RT)/sec.

27882

APTIC NO. 49090

Weychert, Stefan and Ewa Kolakowska

THE COMPOSITION OF THE LIQUID ACTIVE SUBSTANCE IN VANADIUM-POTASSIUM CONTACTS IN EQUILIBRIUM WITH GASES CONTAINING SO₂, O₂ AND SO₃. (*Skład cieklej substancji aktywnej kontaktów wanadowo-potasowych w równowadze z gazami zawierającymi SO₂, O₂ i SO₃*). Text in Polish. *Przemysł Chem.*, 51(8):520-523, 1972. 5 refs.

The composition of the liquid active substance (alloy) of vanadium-potassium contacts was examined by determining the reduction degree of vanadium and the content of sulfur trioxide in alloys of various initial composition. The alloys were in equilibrium with the gaseous phase (with a various initial sulfur dioxide concentration) and were brought to equilibrium state at measurement temperature. The contact active substance appeared in the liquid phase in a large range of temperatures and gaseous phase compositions. The vanadium reduction degree and the content of sulfur trioxide in the alloy underwent great changes related to the current equilibrium conditions. The results allow for conclusions on the sulfur dioxide oxygenation process mechanism for vanadium-potassium contacts.

27883

APTIC NO. 49944

Yusupova, N. A., A. A. Polyakova, I. U. Numanov, and A. I. Skobelina

MASS-SPECTROMETRIC STUDY OF SULFIDES FROM AN INTERMEDIATE FRACTION OF TADZHIK DEPRESSION PETROLEUMS. (*Mass-spektrometricheskoye issledovaniye sulfidov sredney fratsii nef-tey Tadzhikskoy depressii*). Text in Russian. *Dokl. Akad. Nauk Tadzh. SSR*, 15(2):44-46, 1972. 6 refs.

Results of a mass-spectrometric study of the organic sulfur compounds in medium fractions of the heavy petroleum of the Kyzyl-Tumashuk and Khaudag deposits with the respective sulfur contents of 5.90 and 4.05% are presented. Thiamonocyclanes with 10 carbon atoms (35.8 and 33.9 mole%) and thiabicyclanes with 11 C atoms (36.1 and 34.5 mole%) were determined as the major components. Dialkyl sulfides, cycloalkyl sulfides, cyclic mono-, di-, tri-, and tetrasulfides, thiaindanes, thiaindenes, and small amounts of thiophenes were also found.

1971

27884

APTIC NO. 49960

Anderson, Larry W., William F. Lapson, and John W. Schaefer

DESIGN OF A PARTICULATE AERODYNAMIC TEST FACILITY. (FINAL REPORT). *Aerotherm Corp., Mountainview, Calif., Office of Air Programs Contract EHSD 71-44, Proj. 7034, Rept. 71-43, APTD-1158, 128p., Dec. 7, 1971. 23 refs.*

NTIS: PB 214002

A particulate aerodynamic test facility was designed to a particular set of specifications, including gas velocities to 90 ft/sec, temperatures to 450 F, relative humidity control and occasional testing with combustion products as the test gas. Tentative uses for the facility included development of particulate and gas sampling procedures and instrumentation, study of basic collection mechanisms, and study of basic particle flow mechanics. The basic features of other test facilities were considered, and technical considerations were examined to determine facility layout, size, shape, and techniques for heating, humidifying, cooling, and filling the tunnel with exhaust products and particulate matter. The overall design, each major component, construction requirements, controls, instrumentation, and operation of the facility are examined. (Author abstract modified)

27885

APTIC NO. 49978

Debal, Eliane and Roger Levy

ON THE DETERMINATION OF SMALL AMOUNTS OF SULFUR IN ORGANIC COMPOUNDS BY INCINERATION AND COULOMETRY. (LABORATORY REPORT).

(*Sur le microdosage du soufre dans les composés organiques par combustion et coulométrie. (Note de laboratoire).*) Text in French. *Bull. Soc. Chim. France*, no. 9:3374-3376, Sept. 1971. 1 ref. (Presented at the Société Chimique de France and the Société de chimie Industrielle, Thiais, France, March 18-19, 1971.)

Improvement and extension of use of a formerly developed method for the automatic coulometric determination of small quantities of sulfur in organic compounds following incineration in oxygen at a temperature range of 1310-1320 C is described. Interferences due to the presence of selenium are eliminated by cooling the combustion gas and passing it through quartz wool before the coulometric cells. If the quartz wool is followed by silver and a mixture of silver sulfate with potassium pyrosulfate (Melissa reagent) any interference due to Se, chlorine, bromine, and antimony is eliminated. Interferences due to fluorine in excess of 0.5 mg are eliminated by passing the combustion gas through a bubbler containing water with hydrazine sulfate at a temperature of 80 C. This arrangement is also suitable for the analysis of antimony and arsenic. When chlorine, bromine, and iodine are present in addition to fluorine, tin chloride should be used additionally. The sulfur content of substances containing small amounts (0.3-5%) of sulfur plus equal or smaller quantities of halogens can be determined by using a reduced amount of silver wool and Melissa reagent between the incineration tube and the titrating cell, and by choosing a coulometer with increased sensitivity.

27886

APTIC NO. 49863

Didenko, V. E. and Ya. M. Obukhovskii

INVESTIGATION OF THE PROPERTIES OF COALS BY TREATMENT WITH FREE SULPHUR. *Coke Chem. (USSR)* (English translation from Russian of: *Koks i Khim.*), no. 10:11-15, Oct. 1971. 18 refs.

The influence of free sulfur added to Donbas coals was studied. The chemical reactions occurring during semicoking and coking and the carbonization products were modified by free sulfur. These results may assist in the formulation of effective methods to remove sulfur from coal during carbonization, and may revise theoretical views on the behavior of sulfur com-

pounds during the thermal degradation of coals. More effective sulfur removal during carbonization must depend on promoting the formation of volatile sulfur compounds; one possibility is to increase the concentration of atomic hydrogen, which produces more hydrogen sulfide.

27887

APTIC NO. 49909

Goldschmidt, Victor W., Michael K. Householder, Goodarz Ahmadi, and Strong C. Chuang

TURBULENT DIFFUSION OF SMALL PARTICLES SUSPENDED IN TURBULENT JETS. *Preprint*, 36p., 1971. 36 refs. (Presented at the International Symposium on Two-Phase Systems, Haifa, Israel, Aug. 29-Sept. 2, 1971, Paper 4-2.)

The dispersion of liquid droplets in plane two-dimensional air jets was measured and the results were compared with previous experiments and with an analysis based on the assumption of nonrotating spherical rigid particles acted upon by viscous drag given by Stokes law. The approximate analysis predicted the same trend as noted in the experiments. From careful measurements of the concentration flux profiles, the corresponding turbulent transport coefficient was determined. Within most ranges of interest, turbulent transport increased with particle size. (Author abstract modified)

27888

APTIC NO. 49807

Gruenert, Adolf and Guenther Toelg

DETERMINATION OF SULFUR IN THE NANOGRAM RANGE. (*Zur Elementaranalyse des Schwefels im Nanogramm-Bereich*). Text in German. *Talanta*, 18(9):881-894, Sept. 1971. 25 refs.

To determine exactly the nanogram amounts of sulfur in very small amounts of organic substances, hydrogen sulfide, produced by hydrogenation, was determined argentometrically by means of bipotentiometric end-point indication, or fluorimetrically by quenching of the intensity of fluorescence of fluorescein mercuric acetate. The relative standard deviation of the titrimetric method was 2.5% with about 120 ng of sulfur, that of the fluorimetric method 3.7% with about 25 ng of sulfur. Silver sulfide electrodes, developed for the bipotentiometric end-point indication, and methods for standardization are described.

27889

APTIC NO. 49843

McDonald, William J.

AN ANALYSIS OF ELECTROSTATIC DEPOSITION OF PARTICULATE SOLIDS. *Inst. of Electrical and Electronics Engineers, New York, IEEE Int. Conv. Rec.*, 1971, p. 215-222. 1 ref. (Paper ES-MON-5.)

The electrostatic deposition of particulate solids was analyzed with respect to the forces on a particle in an electric field as applied to a device for coating particulate matter on a moving web. The major variables were the size, shape, density, and electrical conductivity of the particle; the field and breakdown strengths of the atmosphere in the coater gap; the construction of the coater; the wave form of the applied voltage; and the particle charging mechanism. (Author abstract modified)

27890

APTIC NO. 49808

Slanina, J., E. Buysman, J. Agterdenbos, and B. Griepink

DETERMINATION OF SULFUR. III. AUTOMATED TITRATION OF NANOGRAM AMOUNTS OF SULFIDE. (*Die Bestimmung des Schwefels. III. Die automatisierte Titration von ng-Mengen Sulfid*). Text in German. *Mikrochim. Acta*, (4):657-661, 1971. 13 refs.

An automated titration of nanogram quantities of sulfide was proposed. The titration was performed using a lead (II) titrant in a solution of 1 M sodium hydroxide and 1.5 M hydrazine which was saturated with lead sulfide. The signal of a silver sulfide ion-specific electrode was used for the titration on a

present end-point. One determination generally took about 4 min. The standard deviation of the determination of samples containing 90 ng or more was about 2%. For samples down to 6 ng the standard deviation extended up to 20%. Halides, sulfate, acetate, cyanide, phosphate, and ammonium did not interfere.

1970

27891

APTIC NO. 49811

Nikitina, V. S., N. K. Lyapina, and A. D. Ulendeyev

ISOLATION OF SULFIDES FROM SULFUROUS CONCENTRATES OF PETROLEUM. (*Vydeleniye sulfidov iz sernistykh koncentratov nefti*). Text in Russian. *Neftekhimiya* (Russia), 10(4):594-598, 1970. 4 refs.

A method for the isolation and chromatographic determination of organic sulfur compounds in concentrates from the 150-250 C fraction of petroleum is described. Silver nitrate selectively reacted, following dilution with n-hexane, with cyclic, aliphatic, and acylaryl sulfides, and was suitable for the selective isolation of sulfides from concentrates of such organic sulfur compounds of the 150-250 C fraction. It is possible, on principle, to apply linear liquid adsorption chromatography (with apiezon on celite, column temperature 120 C, and a hydrogen supply rate of 60 ml/min) in dynamic regime for the group analysis of organic sulfur compounds present in concentrates obtained from kerosene by acid extraction. The groups identified are the total of naphthenes and paraffins, alkylthiophenes, aliphatic sulfides, thiamocyclanes including benzothiophenes, and tjabiacyclanes including alkylaryl sulfides.

27892

APTIC NO. 49805

Shaposhnikov, Yu. K. and E. S. Likhotkin

GAS CHROMATOGRAPHIC STUDY OF THE SOLUBILITY IN N-METHYL PYRROLIDONE OF SOME ORGANIC SUBSTANCES. (*Issledovaniye metodom gazovoy khromatografii rastvoreniya nekotorykh organicheskikh veshchestv v N-metilpirrolidone*). Text in Russian. *Neftekhimiya* (Russia), 10(4):616-619, 1970. 16 refs.

The rate of retention and the coefficients of activity and distribution of n-hexane, n-heptane, benzene, acetone, methyl ethyl ketone, methanol, vinyl acetate, and ethyl acetate in N-methyl pyrrolidone were studied by gas-liquid chromatography, using N-methyl pyrrolidone on Chromosorb W as stationary phase. The N-methyl pyrrolidone was suitable as a selective solvent to be used for the retention of benzene, acetone, methyl ethyl ketone vinyl acetate, and ethyl acetate from their vapor-air mixtures.

1969

27893

APTIC NO. 49457

Lee, Yong Nak

TURBULENT JET OF A CHARGED SUSPENSION. *Illinois Univ., Urbana, Dept. of Mech. Engrg. Thesis (Ph.D.), 1969, 123p. 36 refs.*

The turbulent jet of a gas-solid particle charged suspension was studied. Velocity profiles of the gaseous phase follow the trend of Schlichting's profile and are similar in the initial region; the velocity profile approaches Schlichting's velocity profile as the Reynolds number decreases. The velocity distribution of the gaseous phase at the nozzle mouth is square-headed. The flat-head portion decreases as the axial distance increases. The length of this potential core region is longer due to a secondary flow in the chamber than in the case of no secondary flow. While the potential core region is prolonged due to a secondary flow in the chamber, the variations of the velocity on the axis follow the inverse law as predicted by theory. The virtual origins of the velocity field and the mass

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flux density field are identical when based on the half velocity width and the variation of the velocity on the axis with the axial distance. In a neutral particle suspension, with the velocity profiles in the initial region similar, the mass flux densities are also similar but with different Schmidt numbers, depending on the feed rate. As long as the velocity profile in the initial region is similar, the mass flux densities in the initial region conform to Soo's analytical solution. Mass flux density distributions and, hence, particulate cloud density distributions depend not only on the Reynolds number, but also on the feed rate for the loading ratio of the particulate phase and gaseous phase higher than 0.22. The electrostatic effect in a charged particle suspension is very significant in both the initial laminar region and the well-established turbulent region. Particles with charge-to-mass ratios below 0.00003 coulomb/kg and below 0.0005 coulomb/kg in the initial laminar region and in the well-established turbulent region, respectively, can be regarded as neutral, while any higher value give significant effects on the mass flux distribution and follow Soo's analytical solution.

1968

27894

APTIC NO. 49896

Barringer Research Ltd., Rexdale (Ontario)

FEASIBILITY STUDY FOR SENSING SULPHIDES IN COAL. (FINAL REPORT). *National Centre for Air Pollution Control Contract PH86-67-270, Proj. 385, Rept. TR-68-55, APTD-1252, 40p., Feb. 1968. 1 ref.*

NTIS: 179909

Two coal samples classified as coal without sulfide and with sulfide, respectively, were tested on an experimental prototype sulfide ore monitor (a microwave spectrometer) under development for use in the ore mining industry. The principle employed in the monitor is the absorption of power by the conductive sulfide at radio frequencies, and its measurement gives a quantitative indication of the sulfide present. Circuit changes were made, a signal-to-noise ratio improved, but the signals obtained were still very weak for the 5% maximum sulfur samples. Finally with an abbreviated coil and grid dip circuit between 800 and 940 MHz, sharply increasing signals were obtained which correlated with the sulfur content sequence of the samples. Modifications for work at higher frequencies are also described, as well as the conversion of some of the surface sulfur into sulfur dioxide and its determination with a SO₂ spectrometer. Recommendations for future work are made.

27895

APTIC NO. 49459

Gale, Stephen Bruce

KINETICS OF THE PHOTOCHEMICAL OXIDATION OF SULFUR DIOXIDE IN DILUTE GAS-AIR MIXTURES.

Syracuse Univ., N. Y., Dept. of Physical Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1968, 79p. 13 refs.

The kinetics of the photooxidation of sulfur dioxide were studied. All runs were made at 36 C with SO₂, nitrogen dioxide, water vapor, and intensity levels close to those found in the ambient air. The photooxidation of SO₂ in air follows a first order reversible rate reaction. Increasing the humidity from zero to 22.8 mg H₂O/l dry air caused a five-fold increase in the rate constant. Increasing the NO₂ concentration from zero ppm to 0.872 ppm at 0.0 and 8.8 mg H₂O/l dry air caused the rate constant to double. The effect of NO₂ in this range was almost the same for moist and dry air. The greatest effect of increased irradiation was in the range of 55% of noon sunlight and upwards. Dark reactions of SO₂-air mixtures with and without moisture and NO₂ did not occur under the selected experimental conditions. At the concentration levels normally found in polluted air, addition of 1-butene to an SO₂-air mixture will not affect the rate of conversion of SO₂ to sulfur

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trioxide. Plastics such as plexiglass and Tedlar are unsuitable for studying phot chemical reactions involving SO₂ oxidation, due to adsorption effects.

1967

27896

APTIC NO. 49469

Pilat, Michael Joseph

LIGHT EXTINCTION THEORY APPLIED TO THE ADSORPTION OF GASEOUS POLLUTANTS ONTO AEROSOL PARTICLES. Washington Univ., Seattle, Dept. of Civil Engineering, Thesis (Ph.D.), 1967, 115p. 40 refs.

Light scattering and extinction calculations using concentric spheres as a model were performed to provide a theoretical basis for a direct approach to the measurement of the adsorption of pollutant gases onto the atmospheric aerosol. An equation was developed to calculate the ratio of the concentration of pollutant gas adsorbed on the surface of airborne particles to the gaseous phase pollutant concentration. The variations with time in the relative concentrations of adsorbed sulfur dioxide and nitrogen dioxide in London, New York, and Washington, D. C. were calculated using the developed equations and reported pollutant concentrations. In urban air as much as 0.1% by weight of the pollutants SO₂ and NO₂ may be adsorbed on the surface of airborne particles, the remainder of the pollutants being in a gaseous state. The calculated concentrations of the adsorbed phase of a pollutant gas varies much more with time than the concentration of the gaseous phase. For size parameters less than approximately 3 micron, the light extinction coefficient of concentric spheres composed of a non-light absorbing nucleus, and a light absorbing shell varies greatly as a function of the shell thickness. The use of a light extinction approach to measure the amount of adsorption of a pollutant gas onto the surface of aerosol particles appears to be theoretically feasible. To make such measurements would require a scanning spectrophotometer sensitive to 0.0001/m extinction coefficient, a generator of monodisperse aerosols in the 0.01 to 1.0 micron radius range, and a gas-aerosol mixing system. (Author abstract modified)

1965

27897

APTIC NO. 49866

Sugiyama, K. and T. Takahashi

CHLORINE FORMATION REACTION BY OXIDATION OF POTASSIUM CHLORIDE, PYRITE, AND SULFUR.

(Enka karimu, pairaito oyobi io no sanku ni yoru enso seisei hanna). Kogyo Kagaku Zasshi (J. Chem. Soc. Japan), 68(3):433-437, 1965. (Presented at the Japanese Chemical Society, Annual Congress, 17th, April 1, 1964.) Translated from Japanese, 14p.

Potassium chloride, pyrite, and sulfur were made to react in an electric furnace according to the equation 2KCl plus sulfur dioxide equals potassium sulfate chlorine and the equation 2 pyrite plus 7 oxygen equals iron sulfate plus SO₂. The effects of potassium chloride and pyrite grain size, reaction temperature and time and the pyrite/sulfur mixture ratio on chlorine formation were determined. When 10-30 wt% pyrite was added to potassium chloride, chlorine yield was 55-80% at a reaction temperature of 600-700 C and reaction time of 2-3 hr. Higher yields were not obtained because the deposition of a new solid phase began with the progress of the reaction and finally impeded the diffusion of the produced gas. The SO₂ concentration in this gas was less than 0.5%. The X-ray diffraction studies of quick-cooled solid- and liquid-phase reaction products indicated that the first stage of the reaction was formation of iron oxide (III) and SO₂. Formation of a low-melting point K₃Fe(SO₄)₃-KCl fused salt followed, as a result of which the remaining iron oxide (III) and potassium chloride solid phase rapidly changed into a liquid phase. Chlorine formation was

most intense in the liquid phase. The K₃Fe(SO₄)₃-KCl fused salt system appeared to function effectively as a catalyst in SO₂ oxidation. Test results were compared with thermodynamic calculations of the relationship between temperature and the equilibrium constant of the first equation.

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APTIC NO. 49153

DATA ON AIR POLLUTION BY PHOTOCHEMICAL REACTIONS. (Kokagaku hanna ni yoru taiki osen kankei shiryō). Text in Japanese. Kankōcho Kōgaisenmon Shiryō (Public Nuisance Gaz.), 8(1):85-96, Jan. 1973, 4 refs.

On June 28, 1970, a number of schoolchildren who were playing on the shore of Kisarazu, Chiba Prefecture suddenly had coughing spells, chest pains, and suffocating feelings. It was discovered that similar symptoms were complained of by 360 people in various health centers, and in 24 primary schools and 12 junior high schools (total of 16,344 pupils) in Chiba Prefecture, 5923 or 36% of the children were affected by the pollution of this day. These pollution episodes occurred in Tateyama, Kisarazu, Chiba, Funabashi, and Ichikawa cities. The common characteristics were as follows: coughs, soar throat, and chest suffocation suddenly occurred; incidents were transient, simultaneous in all areas, and multiple in number; the symptoms were light; all incidents occurred out of doors. Uncommon characteristics were as follows: some odor was sensed by some; some people had fevers; some saw white smoke; some plants were affected and lost leaves. The wind was 1-5 m/sec; sulfur oxides concentrations ranged from 0.1 ppm to 0.35 ppm; suspended particulates were approximately 0.81 mg/cu m; nitrogen oxides ranged from 0.025 ppm to 0.086 ppm. A photochemical smog was suspected but not ascertained. Other photochemical incidents in Tokyo, Kanagawa Prefecture, and Osaka are reported.

27899

APTIC NO. 49314

Beck, Ernst Gerhard, Radim Holusa, Dagmar Jirakova, Brona Kysela, Klaus Robock, and Vaclav Skoda

THE DIFFERING EFFECT OF TWO QUARTZES IN THE ANIMAL AND CELL EXPERIMENT AND THEIR PHYSICAL SEMI-CONDUCTOR PROPERTIES. (Ueber die unterschiedliche Wirkung von zwei Quarzen im Tier- und Zellversuch und ihre physikalischen Halbleitereigenschaften). Text in German. Staub, Reinhaltung Luft, 33(1):3-7, Jan. 1973, 12 refs.

Two quartzes with different crystal structure from the same locality had different silicogenic tissue reactions in animal experiments. They also produced different cytotoxicity in cell tests. Correlation was found between fibrogenity and cytotoxicity on the one hand, and on the other, the different electron structure caused by substitutional incorporation of aluminum ions into the silicon dioxide lattice structure.

27900

APTIC NO. 49571

Chin, S. and Y. Nakajima

AIR POLLUTION AS A CAUSE OF CHRONIC BRONCHITIS. (Mansei- kikanshien no genin to shite no taiki-osen). Text in Japanese. Rinsho Kagaku (Clin. Chem.), 9(2):220-226, Feb. 1973, 12 refs.

Mice were exposed to nitrogen dioxide concentrations which were nearly the same as in a polluted atmosphere. The 30 mice were divided into two groups; the first group was exposed to 1.0-1.5 ppm for 1 mo, the second group to 0.3-0.5 for 6 mo. Five animals of each group were killed after exposure and the remaining animals were removed to a clean air room and killed after 1 and 3 mo (five animals each time). Just after exposure,

bronchitis symptoms occurred in the trachea and alveoli. After removal to a clean room, chronic bronchitis occurred with severe infiltration of lymphocytes and monocytes in the respiratory system. The findings resembled symptoms of autoimmune diseases; the cause was considered to be the antigen-antibody reaction with desquamation and debris acting as an antigen on the tracheo bronchial system. The pathological change due to longer exposure in less concentrated NO₂ was more serious than that due to shorter exposure in more concentrated NO₂, and the change remained for more than 3 mo after removing animals to clean air. The reason for this is thought to be a vicious cycle in which a protein in desquamation of the bronchial mucous epithelium becomes an antigen in the antigen-antibody reaction and causes chronic bronchitis which in turn causes denaturation and destruction of the mucosa of the tracheo-bronchial system.

27901

APTIC NO. 49228

Evans, Michael J., Linda J. Cabral, Robert J. Stephens, and Gustave Freeman

RENEWAL OF ALVEOLAR EPITHELIUM IN THE RAT FOLLOWING EXPOSURE TO NITROGEN DIOXIDE.
Am. J. Pathol., 70(2):175-190, Feb. 1973. 39 refs.

The kinetics of Type 2 cell (cuboidal cell) division and the fate of the Type 2 sister cell following exposure to nitrogen dioxide were studied in the alveolar epithelium of rats. One-month-old Wistar rats were exposed to 15-17 ppm NO₂ for 48 hr. After the rats were removed from the exposure chamber, dividing cells were labeled by intraperitoneal injection of 3H-TdR and studied with autoradiographic techniques in the light and electron microscopes for up to 72 hr after labeling. The kinetics of cell division were determined from a curve constructed from the percent of labeled mitotic figures. The fate of the Type 2 sister cells were determined by studying tissues at 24, 48, and 72 hr after labeling with 3H-TdR. Type 2 cells may divide and the sister cells transform into Type 1 cells (squamous cells). These data support an interpretation of the mechanism for cell renewal of the alveolar epithelium in which Type 2 cells are the progenitor cells for Type 1 cells.

27902

APTIC NO. 49149

Hain, Ernst, Heinz Bohlig, Werner Klosterkoetter, Alfred Schuetz, and Hans-Joachim Weitzowitz

ASBESTOS: HEALTH HAZARDS, LIMIT VALUES, PREVENTION. (*Asbest: Gesundheitsschaeden, Grenzwerte, Praevention*). Text in German. Staub, Reinhaltung Luft, 33(2):51-57, Feb. 1973. 20 refs.

The variety of industrial uses of asbestos has resulted in an increase in its consumption (200,000 tons in 1971 in the German Federal Republic). The biological effects of asbestos have been investigated experimentally in cell tests. The effects on humans can be divided into benign tissue changes and cancer development. In the lungs the inhalation of asbestos dust over a longer period of time leads to an increase on the connective tissue between the alveoli (asbestosis). The lung functions are not affected in the initial stages. In the more advanced stages the inhaled air quantity and the lung elasticity are reduced. The fibrotic lung changes continue to develop after termination of exposure. Research during the last 12 years has revealed that the malignant mesotheliomas are mostly due (65 to 85% of the cases) to asbestos. A study of all mesothelioma cases revealed that a considerable portion had nothing to do with asbestos except the patients who lived in the vicinity of an asbestos plant. Their homes were mostly on the leeward side of the main wind direction. Prior to the installation of filters, 5% of the consumed asbestos was emitted. For identification and quantitative determination of asbestos in fine dust no method exists which could be applied for all types of asbestos. Infrared analysis, X-ray diffraction, electron microscopy, and chemical analysis must be used in combination or alone.

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27903

APTIC NO. 49529

Koda, Yoshio

THE ORDER OF HAZARDOUSNESS OF HEAVY METALS IN THE NATURAL ENVIRONMENT. (*Shizen kankyo ni okeru jukinzoku no yugaido no jun i*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 685, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973.)

The mutual and ultimate bondage among metal atoms are expressed by their latent heat of vaporization, and this temperature is directly proportionate to the boiling point. Since the lower the latent heat of vaporization, the easier the element forms bondage, it is considered that the lower the boiling point (higher the steam pressure) the more harm the element will do. Oxygen compounds occupy the major part of the environment, and they have the most intimate relationship with the living body. Metal oxides mostly have high boiling points, but a small number of stable, low boiling compounds are all harmful. Therefore, oxides are included in the table. From the order of harmfulness, the most harmful elements and their oxide forms are: osmium (OsO₄), mercury, cadmium, chromium (CrO₃), zinc, antimony, vanadium (V₂O₅), ytterbium, europium, thallium, bismuth, molybdenum, thulium, and samarium. Other metals and elements have boiling points higher than 2000 C.

27904

APTIC NO. 49510

Lewis, Trent R., William J. Moorman, Walter F. Ludmann, and Kirby I. Campbell

TOXICITY OF LONG-TERM EXPOSURE TO OXIDES OF SULFUR. *Arch. Environ. Health*, 26(1):16-21, Jan. 1973. 26 refs.

Hematological and pulmonary function data were collected on 32 female beagles exposed to 13.4 mg/cu m of sulfur dioxide and 0.9 mg/cu m of sulfuric acid alone and in combination. Sixteen of these dogs had prior exposure to 48.9 mg/cu m of nitrogen dioxide. Exposure to NO₂ altered several hematological indices and produced superinflated lungs. Exposure to sulfur oxides did not affect hematological indices but did significantly increase mean nitrogen washouts (P less than .01) in dogs without prior exposure to NO₂. Exposure to 0.9 mg/cu m H₂SO₄ significantly reduced carbon monoxide diffusion capacity, residual volume, total lung volume, and heart weights and increased total expiratory resistance (P less than .05). Histopathologic lung changes were nonspecific for SO_x exposures; renal changes in non-NO₂ exposed animals were equivocal. (Author abstract modified)

27905

APTIC NO. 49610

Miyaji, Kazuma Hideo Kashiwagi, Susuma Takahashi, and Taneharu Nakamura

THERAPEUTIC PRINCIPLES FOR INCOMPLETE RESPIRATION - THERAPEUTIC PRINCIPLE FOR CHRONIC AND ACUTE DISEASES CAUSED BY AIR POLLUTION WITH THE SO-CALLED YOKKAICHI ASTHMA AS A CENTER. (*Kokyu-fuzen no chiryo hoshin, taiki-osen ni yoru mansei-heisokusei-shikkan no chiryo-hoshin, iwayuru yokkaichi-zensoku o chushin to shite*). Text in Japanese. Sogo Rinsho (Clinic-All Round), 22(2):376-379, Feb. 1973. 6 refs.

Of the diseases of respiratory organs, chronic bronchitis, bronchial asthma, pulmonary emphysema, and asthmatic bronchitis have a close connection with air pollution. In the regions where diseases attributable to public nuisances are officially appointed, these four diseases are the objects of the appointment in Japan. According to an investigation on the patients in the polluted area of Yokkaichi, almost all cases of chronic bronchitis have generated under the polluted environment, many cases of bronchial asthma are considered to have generated under such an environment. Pulmonary emphysema

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occurs from bronchial asthma. It is very difficult to analyze the causal relation of these diseases because the inhabitants in the polluted area do not necessarily suffer from these diseases. However, the influence of air pollution can not be concealed. Several theories have been published on the causal relationship of these diseases, such as the easiness of the invasion of foreign matter due to the decline of ciliary motion of the airways, invasion of antigens from the local lesions of airways, the possible denaturation of protein in airway mucosa, and the enforcement of hypersensitization of the bronchi by oxides of sulfur. Acetylcholine inhalation of healthy peoples in the polluted and non-polluted areas of the city, showed a decrease forced expiratory volume in the former; the ratio of people whose FEV decreased was larger than the latter. Therefore, the pollutant inhibited the beta-acceptor of bronchial mucosa. Based on these findings, the major treatments which have been carried out consist of the isolation of serious patients from the polluted environment into a clean air room, bronchial dilation by drugs, and removal of hypersensitization. The isolation is effective to the patients who have been attacked since the air pollution of the city became suddenly severe (1960).

27906

APTIC NO. 49201

Robock, Klaus and Werner Klosterkoetter

STUDIES CONCERNING THE SPECIFIC TOXICITY OF VARIOUS SiO_2 AND SILICATE DUSTS. (*Untersuchungen ueber die spezifische Schaedlichkeit verschiedener SiO_2 - und Silikatstaube*). Text in German. Staub, Reinhaltung Luft, 33(2):60-63, Feb. 1973. 14 refs.

Experimental investigations of the toxicity of silicon dioxide dusts on cells and animals showed that the quartz content alone did not characterize the dust. The type and extent of foreign ions into the silicon tetraoxide lattice and the thermal, chemical, and mechanical treatment can influence the specific toxicity of SiO_2 dusts. Based on the electron theory of the catalysis, the electron structure of the dusts is considered to be the property that determines its specific toxicity.

27907

APTIC NO. 49755

Scheidemandel, V. and S. Daum

CARBOXYHEMOGLOBIN CONCENTRATIONS IN THE POPULATION OF MUNICH. (*Kohlenmonoxyd-Haemoglobin-Konzentrationen bei der Muenchner Bevoelkerung*). Text in German. Muench. Med. Wochschr. (Munich), 115(4):109-112, 1973. 21 refs.

The carboxyhemoglobin levels were determined in a group of people living in Munich and a comparable group living in the country. Nonsmokers and smokers were considered separately. The COHb value on the nonsmoking, non-occupationally exposed group of Munich residents was 2.36% on the average. This value is higher than that found among a similar group living in Bern, Switzerland. This may be explained by the higher traffic density in the city of Munich. In the winter of 1969/70 6% of the CO concentrations measured at dense traffic intersections in Munich exceeded the maximum allowable value of 50 ppm. The COHb level determined in the nonsmoking rural residents was, on the average, 1.03%. The Munich nonsmoker had significantly higher COHb levels than the comparative group from the country. On the other hand, the COHb levels of smokers from Munich and from the country were significantly higher than those of the nonsmokers. Therefore the percentage saturation of hemoglobin with CO is affected by both the CO content of the air and individual smoking habits.

27908

APTIC NO. 49209

Trezek, George J.

PREDICTIONS OF THE DYNAMIC RESPONSE OF THE LUNG. *Aerospace Med.*, 44(1):8-13, Jan. 1973. 6 refs.

A single lobe resistance-compliance (R-C) network lung model was evaluated by suitable adaptation on an analogue computer

for a range of R and C values encountered in human physiological states. The basic model was extended to a two lobe case which allows for flow bifurcation at the end of the trachea. Adaptation and evaluation on an analogue computer was also accomplished over a range of R and C values. Both step change and sinusoidal pressure changes indicative, respectively, of idealized sudden inhalation and normal breathing were used as forcing functions on the models. Conditions of unbalance, where the resistance, compliance, or both, of one lobe are different from the other, were examined. Severely unbalanced conditions gave rise to pendulluft, a lung disorder in which flow from one side is not exhaled during an exhalation but rather inhaled into the other side during the following inhalation. (Author abstract modified)

27909

APTIC NO. 49117

Watanabe, K.

ENVIRONMENT AND ALLERGY, ESPECIALLY BRONCHIAL ASTHMA. (*Kankyo to arerugi, koto ni kikanshi zensoku*). Text in Japanese. Baioteku (Biotech.), 4(2):120-125, Feb. 1973. 18 refs.

The effects of environmental changes caused by modern industrial development on human health are considered, especially in the field of allergy. Bronchial asthma, one of the typical allergic diseases, is caused by the type I reaction of allergy, sometimes by types II and III. The disease has a major symptom of paroxysmal dyspnea and is characterized by hypersensitivity of airways and by hereditary constitution. In Japan, the number of patients with bronchial asthma is estimated to be 1% of total population; it is more predominant in adults than in children and more frequent in men than in women. The cause is complex in nature and many factors are considered. Inhalational allergens must be considered with several insensitives, especially stimulation caused by change of climate, weather, odor, and smoke. It is well known that sulfur dioxide causes asthmatic paroxysm, however, photochemical smogs, possibly due to oxidants such as ozone and nitrogen oxides, have stronger activity to cause the asthmatic paroxysms than SO_2 in the air. It is also possible that the increased air pollutants not only directly cause the asthma itself, but also cause chronic bronchitis and pulmonary emphysema and the inflammation of airways, thus becoming the stimulant to the living body to accelerate the sensitization by inhalative antigens, producing more antibodies and making the pollutants themselves have antigenic properties. The environments surrounding human beings are divided into two categories, micro and macro. The macroscopic artificial pollution must be controlled as far as possible, but the microscopic environment must also be improved.

27910

APTIC NO. 49180

Weiss, Zdenek, Olga Mrázková, Brona Kysela, Václav Skoda, and Radim Holusa

STUDIES OF THE LATTICE CONSTANTS OF QUARTZES IN CONNECTION WITH THEIR BIOLOGICAL EFFECT IN THE ANIMAL EXPERIMENT. (*Untersuchungen ueber die Gitterkonstanten von Quarzen im Zusammenhang mit ihrer biologischen Wirkung im Tierexperiment*). Text in German. Staub, Reinhaltung Luft, 33(1):10-14, Jan. 1973. 19 refs.

The lattice constants of six quartzes with different conditions of genesis were measured by diffractometer and their silicogenic effects were determined histologically and biochemically in animal experiments. The different silicogenic effects were related to changes in lattice constants. The dusts used for the intratracheal application on white male rats were prepared according to a special method which permitted a comparison of the biological effects caused by the different dusts. After heating the separated and mechanically cleaned quartz to a temperature of 800 C, it was quenched in distilled water to 100 C. Afterwards it was ground in a wooden ball mill. The wood dust which was produced was burned. Then the material was

mechanically ground in an agate dish, separated by sedimentation in distilled water, and heated again to 800 C. The dust obtained by this method had grain sizes of less than 5 micron. The rats received 50 mg quartz dust in a 1 ml physiological solution. After 3 months the animals were killed and their lungs examined. The wet weight of the lungs and the concentration of hydroxyprolin, of total lipids, of phospholipids, and of cholesterol were determined. The lungs were also histologically examined. The absolute values of the above substances were found to have increased in the initial stages of the silicotic tissue reactions.

1972

27911 APTIC NO. 49103
Council for the Living Environment (Japan), Committee on Carbon Monoxide Environmental Standard

MEASUREMENTS OF AIR POLLUTION BY CARBON MONOXIDE AND ITS EFFECTS ON THE HUMAN BODY. II. (*Issanka tanso (CO) ni yoru taiki osen no sokutei to hito e no eikyo*). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 7(4):695-743, 1972. 50 refs.

Data concerning carbon monoxide pollution is presented. The topics include the general effects of CO on human health with various data, the measuring methods, the measuring standards and their evaluation, trends, and pollution control measures. Investigations were made in 1965 on some inhabitants of a polluted area in Tokyo, some inhabitants of a non-polluted area, and some policemen and students who commuted to polluted areas. The average carboxyhemoglobin (COHb) quantity for the people in the polluted area was 4.27%, and 2.79% for the people in the nonpolluted area. The daily fluctuation of COHb in the people in the polluted area was 4.17% in the morning and 4.37% later during the day. But the commuters to the polluted area had 2.62% COHb in the morning 3.75% later. There was a correlation between COHb in blood and CO concentration in the environment. The COHb was low on days when the maximum concentration of CO was less than 5 ppm; and when the daily maximum was between 5 and 10 ppm, the inhabitants, policemen and students all showed higher COHb counts. More than half the patrolmen in automobiles had more than 10% COHb, and more than half the patrolmen on motorcycles had more than 20% COHb. Clerical, traffic, and patrol policemen all show much higher COHb levels during the winter.

27912 APTIC NO. 49109
Central Council for Pollution Countermeasures (Japan), Special Committee on Environmental Standards of Nitrogen Oxides and Other Pollutants

A REPORT OF THE SPECIAL COMMITTEE ON ENVIRONMENTAL STANDARDS OF NITROGEN OXIDES AND OTHER POLLUTANTS. (*Chisso sankabutsu nado ni kakawaru kankyo kijun ni tsuite no senmon iinkai hokoku*). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 7(3):151-155, Dec. 1972.

Nitrogen oxides and photochemical oxidants in the environment and their effects on the human body were studied. The chronic effects of nitrogen dioxide are serious and multiply in the presence of sulfur dioxide. The 24-hour average of the hourly average standard should be less than 0.02 ppm. Photochemical oxidants have acute damaging effects, and hourly averages should be kept under 0.06 ppm. The health effects of these pollutants are recognized in the respiratory system in general, especially in the lungs. On experimental animals, a 4-hour exposure to 0.5 ppm NO₂ causes damage to lung cells, which develops into bronchiolitis and emphysema in several months. The exposure also sensitizes the living body to pneumonia and influenza viruses and increases mortality. A 4-hour exposure to 1 ppm of ozone easily damages the deeper part of the respiratory system, and in 20 hr, light cases of emphysema are recognized. After a long exposure to ozone,

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bronchitis, bronchiolitis, emphysema, pulmonary fibrosis, and adenoma are caused. A 3-hour exposure to 0.25-0.5 ppm of ozone causes the rise of resistance in the air passage, and an hour exposure to 1 ppm of ozone changes the lung cell protein system. Other possible effects are to the blood cells, brains, heart, liver, kidney, and other systems of the living body. In addition, unpleasantness, odor, damage to vision, deterioration of rubber, and damage to plants are caused.

27913 APTIC NO. 49110
Council for the Living Environment (Japan), Committee on Carbon Monoxide Environmental Standard

MEASUREMENTS OF AIR POLLUTION BY CARBON MONOXIDE AND ITS EFFECTS ON THE HUMAN BODY. I. (*Issanka tanso (CO) ni yoru taiki osen no sokutei to hito e no eikyo*). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 7(4):671-694, 1972. 43 refs.

Previously published data on the measurements of carbon monoxide and its effects on the human body are comprehensively presented in tables. The table on the general effects on the human body consists of measuring methods, concentration, co-existing chemical matter, the effects on the human health, and the sources of information. The effects include the light damages from the environmental CO concentration in actual cases to mortality both in actual cases and experimental animals. Effects such as anemia, nausea, increase of carboxyhemoglobin, damage to the circulatory system, deterioration of the brain functions, anoxia, headache, fatigue, damages to the nervous system, numbness, palpitation, and breathing difficulty are noted. Sex and age of the patients, exposure duration, the degree of coma at the time of examination, the degree of detectability, congestion of air passages, constriction noted by decerebrization examination, body temperature, the survival time, the direct cause of deaths, and other symptoms of CO poisoning are presented in a table.

27914 APTIC NO. 49910
National Academy of Sciences, Washington, D. C., Committee on Biologic Effects of Atmospheric Pollutants

PARTICULATE POLYCYCLIC ORGANIC MATTER. Environmental Protection Agency Contract CPA 70-42, 374p., 1972. 836 refs.

The complete spectrum of particulate polycyclic aromatic hydrocarbons is reviewed with specific application to their biological effects. The structure, nomenclature, sources, atmospheric physics, carcinogenic and cocarcinogenic properties, sampling and analytical techniques, distribution, excretion, and metabolism in the organism, clinical and epidemiologic tests, and characteristics of related human diseases are examined. The effects of exposure to polycyclic organic matter includes cancer of the skin and lungs, nonallergic contact dermatitis, photosensitization reactions, hyperpigmentation of the skin, folliculitis, and acne. There is also convincing statistical evidence of a dominant relation between cigarette smoking and lung cancer; the important factor is the presence of aromatic hydrocarbons, e.g., benzo(a)pyrene. The urban factor in the pathogenesis of lung cancer in man is correlated on a synergistic basis with respect to atmospheric contents of aromatic hydrocarbons.

27915 APTIC NO. 49138
Asahina, S., J. Andrea, A. Carmel, E. Arnold, Y. Bishop, S. Joshi, D. Coffin, and S. S. Epstein

CARCINOGENICITY OF ORGANIC FRACTIONS OF PARTICULATE POLLUTANTS COLLECTED IN NEW YORK CITY AND ADMINISTERED SUBCUTANEOUSLY TO INFANT MICE. Cancer Res., vol. 32:2263-2268, Oct. 1972. 29 refs.

Groups of randomly bred infant Swiss mice were given subcutaneous injections of suspensions of (a) an organic extract of

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particulate pollutants collected in New York City; (b) derived acidic, basic, neutral, aliphatic, aromatic, and insoluble fractions; and (c) three oxynutral subfractions in total doses of 10, 20, and 40 mg. Each test group consisted of a minimum of 44 mice; concurrent controls comprised 81 untreated and 86 solvent-treated mice. There were wide variations of overall carcinogenicity and tumor incidence in various organs in different test groups. High incidences of hepatomas were found in males given injections of the basic fraction and the benzene-soluble extract and to a lesser extent in males and females given injections of the organic extract. The incidence of lymphomas was high, particularly in females given injections of basic, aliphatic, and aromatic fractions and oxynutral subfractions. High incidences of solitary and multiple pulmonary adenomas were found in mice given injections of basic neutral, and aromatic fractions and oxynutral subfractions. Coexistent multiple tumors were also found in mice given injections of basic and aromatic fractions and oxynutral subfractions. Injection site tumors were rare. The individual total incidence of hepatomas, solitary and multiple lung tumors, lymphomas, and miscellaneous tumors in all control and treatment groups is listed; the identity of all tumors was established histologically. The data confirm the sensitivity of neonatal mice in the carcinogenic bioassay of organic extracts and derived fractions of particulate pollutants. The induction of various combinations and remote tumors by the benzene-soluble extract and its fractions indicates the existence of a variety of different chemical carcinogens in organic extracts of air pollutants, with the exception of benzo(a)pyrene which is largely concentrated in aromatic fractions. (Author summary modified)

27916

APTIC NO. 49868

Bokina, A. I., T. A. Nikolayeva, and T. S. Khachatryan

A STUDY OF CERTAIN ASPECTS OF GASTROINTESTINAL TRACT FUNCTION IN PERSONS DRINKING WATER WITH A HIGH BORON CONTENT FOR A PROLONGED PERIOD OF TIME. (*Izucheniye nekotorykh storon funktsional'noy deyatel'nosti zheludochno-kishechnovo trakta u lyudey dritel'no potreblyayushchikh pit'evuyu vodu s povyshennym soderzhaniiem bora*). *Gigiena i Sanit.*, 37(5):19-24, 1972. 12 refs. Translated from Russian, 10p.

The effect of boron on gastrointestinal tract functions was investigated in 109 adults and 35 children after long-term use of drinking water containing 4.6 mg/l boron. Gastric acidity was determined in adults, and enteric, nasal and alkaline phosphatase activity in the feces of children. The incidence of hypocalcemia among the adults was significantly higher than among 106 control subjects living in an area where water boron content was 1.46 mg/l. In the test area, normal acidity was observed in 40 (36.7%) subjects, high in four (3.3%), and low in 65 (60%). In the control area, acidity was normal in 76 subjects, high in two (1.9%), and low in 28 (26.4%). Hypoacidic intestinal conditions increased with age and were observed more often in women than in men. Enterokinase levels in the feces of children (1-3 years old) exposed to drinking water with a high boron content were 220 plus or minus 23 units/g compared with 890 plus or minus 76 units/g for 38 children in the control area. No significant difference was noted in alkaline phosphatase levels, which were 420 plus or minus 425 unit/g in the test children and 873 plus or minus 357 units/g in the control children. These results indicate that high boron concentrations in drinking water have an unfavorable effect on the human organism.

27917

APTIC NO. 49438

Bussey, William M.

CHRONIC EXPOSURE OF ALBINO RATS TO CERTAIN AIRBORNE POLLUTANTS. (FINAL REPORT).

Hazleton Labs., Inc., Vienna, Va., Coordinating Research

Council Proj. CAPM-6-68, Rept. CAPM-6-68-6, 260p., July 1972. 24 refs.

NTIS: PB 212794

The effects on albino rats of chronic exposure to nitrogen dioxide, sulfur dioxide, carbon monoxide, calcium sulfate, and lead chlorobromide were studied. Materials, methods, and animal groups used, exposure conditions, methods of pollutant generation, analytical determination of chamber concentrations, biological measurements, and data analysis are reviewed. Biological observations include tests of body weight, clinical symptom studies, pulmonary function tests, diffusion index studies, hematological and serum biochemical determinations, blood lead level determinations, pathological techniques, erythrocyte osmotic fragility determinations, arterial blood gas analysis, and microscopic examination of the tissues. The inhalation exposure resulted in microscopic exposure-related alterations in the lungs of rats exposed to 6.82 ppm NO₂ and in the kidneys of rats exposed to 0.54 mg/cu m PbClBr. Relative to the controls, blood lead levels increased significantly in all groups of female rats exposed to PbClBr alone or in binary combination with NO₂, SO₂, and CO and in male rats exposed to PbClBr alone and in combination with 66.07 ppm CO. No consistent pulmonary function changes were determined in any of the exposed groups as an inhalation consequence. (Author summary modified)

27918

APTIC NO. 49439

Bussey, William M.

SUMMARY REPORT: STUDY OF SYNERGISTIC EFFECTS OF CERTAIN AIRBORNE SYSTEMS IN THE CYNOMOLGUS MONKEY. (FINAL REPORT).

Hazleton Labs., Inc., Vienna, Va., Coordinating Research Council Proj. CAPM-6-68, Rept. CAPM-6-68-5, 162p., June 1972. 38 refs.

NTIS: PB 212793

The effects on monkeys of nitrogen dioxide, sulfur dioxide, carbon monoxide, and lead chlorobromide singly and in binary combination with each other or calcium sulfate were investigated. Data on the animals and groups used, methodology, exposure conditions, methods of pollutant generation, analytical determination of chamber concentrations, biological measurements, and statistical methods are summarized. A high level of NO₂ whether alone or in combination with SO₂ (0.48 ppm), CO (20.26 ppm), or CaSO₄ (7.81 mg/cu m) impaired distribution of inspired air and increased respiratory rate. No synergistic effects were determined. At 6.78 ppm, NO₂ significantly increased osmotic fragility of erythrocytes at the 50% hemolysis level. Chronic exposure to SO₂ at concentrations as high as 10.17 ppm alone or in combination with the other pollutants had no detrimental effect. Except for elevated carboxyhemoglobin values, exposure to CO had no significant biological effects. No synergistic effects were determined for any of the binary combinations, except possibly in the combination of 10.17 SO₂ with 20.49 CO which significantly increased the osmotic fragility of erythrocytes. The exposure to 0.51 mg/cu m PbClBr and to binary combinations with CO, SO₂, and NO₂ had an adverse effect on the distribution of ventilation, but with no evidence of synergistic action. All groups exposed to PbClBr showed decreased osmotic fragility of erythrocytes, increased blood lead level, and increased deltaaminolevulinic acid and urinary coproporphyrin levels.

27919

APTIC NO. 49440

Bussey, William M.

CHRONIC EXPOSURE OF CYNOMOLGUS MONKEYS TO SULFUR DIOXIDE SINGLY AND IN BINARY COMBINATION WITH CERTAIN AIRBORNE POLLUTANTS. (FINAL REPORT). Hazleton Labs., Inc., Vienna, Va., Coordinating Research Council Proj. CAPM-6-68, Rept. CAPM-6-68-4, 520p., 1972. 32 refs.

NTIS: PB 212792

The effects on monkeys of sulfur dioxide singly and in binary combination with nitrogen dioxide, carbon monoxide, lead chlorobromide, and calcium sulfate were investigated. Data on the animals and groups studied, exposure conditions, methods of pollutant generation, analytical determination of chamber concentrations, biological measurements, and statistical methods are examined. The inhalation exposure of the monkeys to 0.49 or 9.70 ppm SO₂ for 104 weeks had no detrimental effects on pulmonary function, hematological or biochemical measurements, arterial blood gas concentrations, or tissues. Combinations of 0.48 ppm SO₂ with 7.37 ppm NO₂ and 9.93 ppm SO₂ with 0.50 mg/cu m PbClBr resulted in changes in pulmonary function, blood parameters, and histopathological changes, all of which were attributed entirely to the pollutant added to the SO₂ concentration; there was no evidence of synergistic effects. The effects of these pollutants on the osmotic fragility of erythrocytes were also studied. (Author summary modified)

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APTIC NO. 49441

Busey, William M.

CHRONIC EXPOSURE OF CYNOMOLGUS MONKEYS TO CARBON MONOXIDE SINGLY AND IN BINARY COMBINATION WITH CERTAIN AIRBORNE POLLUTANTS. (FINAL REPORT). Hazleton Labs., Inc., Vienna, Va., Coordinating Research Council Proj. CAPM-6-68, Rept. CAPM-6-68-1, 462p., April 1972. 33 refs.

NTIS: PB 212790

The effects on monkeys of carbon monoxide singly and in binary combination with nitrogen dioxide, sulfur dioxide, and lead chlorobromide were investigated. Data on the animals and groups studied, exposure conditions, methods of pollutant generation, analytical determination of chamber concentrations, biological measurements, and statistical methodology are examined. Except for elevated carboxyhemoglobin values at the first exposure period measurement, exposure to 19.86 ppm CO for 104 weeks had no significant biological effects. The combination of 10.17 ppm SO₂ with 20.49 ppm CO significantly increased the osmotic fragility of erythrocytes; other binary combinations had no synergistic effects. The important effect on distribution of ventilation in the group exposed to 6.78 ppm NO₂ alone was also determined in the group exposed to 7.08 ppm NO₂ in combination with 20.26 ppm CO. The dose-related increase in COHb was clearly attributed to CO; the addition of the other pollutants had no effect on the increase. (Author summary modified)

27921

APTIC NO. 49442

Busey, William M.

CHRONIC EXPOSURE OF CYNOMOLGUS MONKEYS TO LEAD CHLOROBROMIDE SINGLY AND IN BINARY COMBINATION WITH CERTAIN AIRBORNE POLLUTANTS. (FINAL REPORT). Hazleton Labs., Inc., Vienna, Va., Coordinating Research Council Proj. CAPM-6-68, Rept. CAPM-6-68-3, 337p., April 1972. 37 refs.

NTIS: PB 212791

The synergistic effects on cynomolgus monkeys of lead chlorobromide singly and in combination with nitrogen dioxide, sulfur dioxide, and carbon monoxide were investigated. Data on the animals and groups tested, exposure conditions, pollutant generation, analytical determination of chamber concentrations, biological measurements, and statistical analyses are examined. The inhalation exposure of the monkeys to 0.51 mg/cu m PbClBr for 104 weeks had an adverse effect on the distribution of ventilation which was not appreciably different from the effect of binary combinations of 0.54 mg/cu m PbClBr and 0.48 ppm NO₂, 0.50 mg/cu m PbClBr and 9.93 ppm SO₂, or 0.47 mg/cu m PbClBr and 66.43 ppm CO. Exposure to these levels of PbClBr concentrations, alone or in binary combinations, resulted in significant kidney effects characterized by degeneration of the proximal convoluted tubules. Additional symptoms of PbClBr exposure included

decreased osmotic fragility of erythrocytes, increased blood lead level, and increased delta-aminolevulinic acid and urinary coproporphyrin levels. (Author summary modified)

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APTIC NO. 49443

Busey, William M.

CHRONIC EXPOSURE OF CYNOMOLGUS MONKEYS TO NITROGEN DIOXIDE SINGLY AND IN BINARY COMBINATION WITH CERTAIN AIRBORNE POLLUTANTS. (FINAL REPORT). Hazleton Labs., Inc., Vienna, Va., Coordinating Research Council Proj. CAPM-6-68, Rept. CAPM-6-68-2, 549p., Feb. 1972. 33 refs.

NTIS: PB 212797

The effects of chronic exposure of cynomolgus monkeys to nitrogen dioxide singly and in binary combination with sulfur dioxide, carbon monoxide, lead chlorobromide, and calcium sulfate were investigated. Data on the animals and groups tested, exposure conditions, methods of pollutant generation, analytical determination of chamber concentrations, biological measurements, and statistical analyses are examined. Exposure to 0.51 ppm NO₂ for 87 weeks had no significant effect other than a slight increase in respiratory rate. Exposure to 6.78 ppm NO₂ for 104 weeks significantly increased respiratory rate, decreased tidal volume, and resulted in significant lung alterations. A combination of 0.48 ppm NO₂ and 0.54 mg/cu m PbClBr significantly reduced the distribution of ventilation, increased respiratory rate, and resulted in significant kidney changes; these results, however, were attributed to the action of PbClBr and not to a synergistic action of the binary combination. A combination of 0.48 ppm SO₂ with 7.37 ppm NO₂ and 7.08 ppm NO₂ and 20.26 ppm CO resulted in ventilatory function change. Exposure to 7.05 ppm NO₂ and 7.81 mg/cu m CaSO₄ resulted in a rapid deterioration of the distribution of ventilation. The effects on arterial blood gas and erythrocytes were also studied. (Author summary modified)

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APTIC NO. 49741

Chapman, Robert S., Carl M. Shy, John F. Finklea, Dennis E. House, Harvey E. Goldberg, and Carl G. Hayes

CHRONIC RESPIRATORY DISEASE SYMPTOM FREQUENCY IN PARENTS OF SCHOOL CHILDREN AND IN MILITARY INDUCTEES. Preprint, American Medical Assoc., Chicago, Ill., 20p., 1972. 12 refs. (Presented at the Air Pollution Medical Research Conference, 13th, Chicago, Ill., Oct. 2-3, 1972.)

Four surveys investigating the respiratory effects of chronic exposure to sulfur oxides and various levels of total suspended particulates are reviewed. A fifth survey was conducted near a munitions plant to determine the effects of exposure to nitrogen dioxide. Air quality was measured over the Salt Lake Basin, smelter communities in Idaho and Montana, in the New York Metropolitan area, and over the Chicago area. The subjects included parents of school children and military inductees. Sulfur oxides contributed substantially to the aggravation of chronic respiratory diseases, rivaling the effect of moderate cigarette smoking, particularly in areas with high concentrations of SO_x and particulates. The effects of SO_x and smoking on chronic bronchitis prevalence were roughly additive.

27924

APTIC NO. 49283

Chen, C., Yasutomo Nakashima, and Shigeo Kusumoto

CHRONIC BRONCHITIS OF THE MICE EXPOSED TO 0.3-0.5 PPM NO₂ GAS. (0.3-0.5 ppm NO₂ bakuro ni yoru mauzu no mansei kikanshien no hassei). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 149. (Nov. 7-9, Paper 149.)

Three-week-old mice were exposed to 0.3-0.5 ppm of nitrogen dioxide for 6 months, and the changes that occurred in the respiratory system were histologically examined. The exposure group was compared with groups that were transferred to a clean air chamber 1 mo and 3 mo after the initiation of the ex-

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periment, and with those raised in clean air for 7 mo. The lungs and trachea of the control group showed no anomalies. In the exposed group, mucous secretion increased, mucous epithelium increased, and separation occurred. The group removed after 1 mo showed the separation of mucous epithelium and lymphocyte infiltration. The lungs of the exposed group showed the separation and destruction of minute bronchial epithelium and congestion. In the lungs of the group removed after a month, lymphocytes surrounded the minute trachea. An exposure to dilute NO₂ can cause chronic bronchitis and chronic tracheitis.

27925

APTIC NO. 49336

Collier, C. R., J. M. Workman, J. G. Mohler, J. Aaronson, and O. Cabula

PHYSIOLOGICAL ADAPTATIONS TO CARBON MONOXIDE LEVELS AND EXERCISE IN NORMAL MEN. *University of Southern California, of Los Angeles, Dept. of Medicine, Environmental Protection Agency Contract 68-02-0334, Program 1A1007, EPA-R1-72-002, 20p., July 1972. 25 refs.*

NTIS: PB 213834

Normal young nonsmoking men were tested at rest and during submaximal exercises to determine the effect of carbon monoxide inhalation to increase the carboxyhemoglobin from 1% to 8.9% on the physiological defense mechanism of the body. Arterial and mixed venous blood was sampled. The CO increased the minute volume and breathing frequency during exercise but not at rest; did not affect cardiac output, heart rate, lactate, lactate/pyruvate ratio, tidal volume, carbon dioxide output, or 2,3 DPG during rest or exercise; and decreased oxygen consumption, arterial-venous O₂ content difference, and venous O₂ and polonium content during exercise and, in the latter two, at rest. Changes in O₂ affinity were calculated. (Author summary modified)

27926

APTIC NO. 49347

Doi, R., M. Sekizawa, S. Nagaoka, H. Watanabe, and T. Suzuki

A NOTE ON HUMAN HEALTH EFFECTS OF PHOTOCHEMICAL OXIDANTS-AN INVESTIGATION BY QUESTIONNAIRE AT TOKYO RISSHO WOMEN'S SENIOR HIGH SCHOOL. In: *Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection. Tokyo Metropolitan Environmental Protection Research Inst. (Japan), p. 51-61, 1972.*

A questionnaire survey on the health effects of photochemical oxidants was conducted among students and the staff of Tokyo Risho Women's Senior High School in Dec. 1970 following a serious pollution episode on July 15, 1970. During the pollution episode, the area around the school was enveloped by heavy smog in the morning, though it was a sunny day otherwise. Some students who were exercising in the school grounds complained of strong eye irritation and a persistent hacking cough, and later almost all students were attacked by similar symptoms, with dyspnea, chest pain, muscular cramps, and sensory disturbances in a few cases. Most of the more than 40 students hospitalized responded well to oxygen therapy and eyewashing and were discharged from the hospital by evening. The questionnaire sent out subsequently was composed of family history, past history, and 26 symptoms including common respiratory symptoms. The frequency of students with complaints, as determined from the questionnaire replies, was higher in groups that had been in and around the school than in groups who were outside the school, and higher in the groups that had been exercising than in the groups that had not been exercising. The more prevalent symptom was pain in the eyes and eye discomfort, followed by throat pain, cough, dyspnea, stridor, chest pain, fatigue, weakness, and numbness in the extremities. Judging from the evidence of eye and throat irritation, and the high oxidant level of 37 ppm recorded at an air pollution monitoring station at a distance of 4.8 km from

the school, photochemical oxidants are considered to be a possible causative agent. However, severe symptoms, e.g., dyspnea, muscular cramps, and syncope, have not yet been reported in similar episodes caused by photochemical oxidants, e.g., in Los Angeles and other cities.

27927

APTIC NO. 49350

Drozd, T. N.

NATURE AND BIOLOGICAL SIGNIFICANCE OF LIPOFUSCIN. (*O prirode i biologickom nachenii lipofustina*). *Ark. Patol.*, 2(34):75-79, 1972. 84 refs. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 15p.

The nature and biological significance of lipofuscin (a pigment) in the human body are reviewed with respect to chemical composition, stages of development, biological function, formal genesis, and presence in the various organs. Various theories are presented and discussed, based on the knowledge of the integrated activity of enzymes on the level of cell organization.

27928

APTIC NO. 49334

Ehrlich, Richard and James D. Fenters

INTERACTIONS OF VARIOUS AIR POLLUTANTS ON CAUSATION OF PULMONARY DISEASE. FINAL REPORT. *IIT Research Inst., Chicago, Ill., Environmental Protection Agency Contract EHSD 71-37, Proj. IITRI-L6061-8, EPA-R1-72-003, 63p., Oct. 30, 1972. 12 refs.*

NTIS: PB 214064

Various studies on the effect of exposure to nitrogen dioxide, chromium trioxide, and nickel oxide on the resistance of experimental animals to viral and bacterial infection are discussed. Long-term exposure of squirrel monkeys to nitrogen dioxide, the interaction of nickel oxide and respiratory infection in hamsters, the interaction of chromium trioxide and respiratory infection in mice, and the immune response in mice during long-term nitrogen dioxide exposure are reviewed. The experimental material, methods, and equipment are reviewed, including scanning electron microscopic examinations and vaccination. All tests are described, and the mortality and histopathological results are discussed.

27929

APTIC NO. 49652

Fiserova-Bergerova, Vera and Ludvik Cettl

ELECTRIC MODEL FOR THE ABSORPTION, METABOLISM, AND EXCRETION OF BENZENE IN MAN. (*Elektricky model pro vstrebovani, metabolismus a vylucovani benzenu u cloveka*). *Pracovni Lekar. (Prague)*, 24(2-3):56-61, 1972. 26 refs. Translated from Czech., 16p.

An electrical analog was set up for the uptake, distribution, metabolism, and excretion of benzene in man. The values for the resistance and capacities in the electrical analog were derived by analogy to physiological factors -- blood flow in tissue, lung ventilation, tissue volume, and tissue capacity to absorb benzene. The partition coefficients for benzene between tissue and air and the metabolic coefficient were other limiting factors. The model was developed for a three-compartment system and solved on an analog computer, MEDA 40T. The calculated rates of uptake and excretion of benzene through the lung were compared with experimental values. With the electrical analog it is possible to predict levels of toxic compounds in individual tissue compartments, and the velocity of their uptake and excretion in dependence on physiological and physical factors.

27930

APTIC NO. 49507

Grandjean, E.

EPIDEMIOLOGY OF AIR POLLUTANTS. (*Epidemiologie der Luftverunreinigungen*). Text in German. *Schweiz. Med. Wochenschr.*, 102(52):1889-1897, Dec. 30, 1972. 33 refs.

Mortality is parallel to the level of air pollution. Respiratory, heart, and circulatory diseases are the commonest causes for the excess mortality. Two major studies in the U. S. have shown that populations in areas of high pollution suffer increased mortality, increased cancer mortality, and increased respiratory disease mortality. The relationships are independent of socio economic status. The highest correlations were between sulfur dioxide and suspended particulate concentrations. Further studies suggest that the nitrogen dioxide content of the air is also related to an increased incidence of bronchitis. Carbon monoxide, which is thought to influence the nervous function at concentrations of 50 ppm, may also exert an influence on the course of coronary disease.

27931

APTIC NO. 49253

Griffin, Reginald M. and Wayne R. Matson

THE ASSESSMENT OF INDIVIDUAL VARIABILITY TO TRACE METAL INSULT: LOW-MOLECULAR-WEIGHT METAL COMPLEXING AGENTS AS INDICATORS OF TRACE METAL INSULT. *Am. Ind. Hyg. Assoc. J.*, 33(6):373-377, June 1972. 11 refs. (Presented at the American Industrial Hygiene Association Conference, Toronto, Ontario, May 24-28, 1971.)

The interaction and time distribution of cadmium, lead, and copper in the sera and red blood cells of rats dosed with sub-acute amounts of cadmium were studied by the combined techniques of anodic stripping voltammetry and gel filtration chromatography. Experimental methods and design are presented. Low-molecular-weight trace metal complexing agents in the serum were identified. There significance as possible indicators of individual variation in response to heavy metal insult and as a means of assessing environmental levels were discussed.

27932

APTIC NO. 49223

Griffiths, J. E.

ACUTE INHALATION AND DERMAL APPLICATION SCREENING STUDIES OF 2,4,6-TRIFLUORO-SYM-TRIAZINE AND 2,4,6-TRIS(TRIFLUOROMETHYL)-SYM-TRIAZINE. *Am. Ind. Hyg. Assoc. J.*, 33(6):382-388, June 1972. 7 refs.

Screening studies of the effects of acute inhalation of 2,4,6-trifluoro-sym-triazine ((FCN)3 -- known as cyanuric fluoride) and of 2,4,6-tris(trifluoromethyl)-sym-triazine ((CF3CN)3) on male albino rats are reported. Values for LC50 of 3 ppm for cyanuric fluoride and 1400 ppm for 2,4,6-tris(trifluoromethyl)-sym-triazine were found. Acute dermal application studies of the same two chemicals on rabbits are also reported. The lethal dose 50 values of 100 microliters/kg of body weight for cyanuric fluoride and more than 1000 microliters/kg of body weight for (CF3CN)3 were established. The cyanuric fluoride was particularly insidious because of its high skin permeability. Data on human response to either chemical it not well documented and therefore is quite subjective. Small quantities as low as about 1 to 5 ppm of cyanuric fluoride can be detected from its pungent odor before other body senses respond. At higher levels, burning of the eyes and breathing discomfort are readily apparent. The properties of cyanuric fluoride and (CF3CN)3, and data on the effects of both chemicals on the trachea, lungs, liver, spleen, and kidneys of rats are given.

27933

APTIC NO. 49264

Hanlon, John J.

CHAPTER VII: ENVIRONMENTAL HAZARDS. *Federation Proc., Part II*, 31(6):TF101-TF120, Nov./Dec. 1972. 65 refs.

Biological, chemical, and physical hazards to man are reviewed. The biological dangers to human health are mostly those posed by bacteria, viruses, and other microorganisms and parasites. The chemical hazards exist in all three aspects

AIR POLLUTION ABSTRACTS, JUNE 1973

of the environment: air, water, and soil. These environmental pollutants may have a wide range of adverse biological effects, from health impairment to death, and may play a significant role in immunological impairment or psychological disorders. Some pollutants produce any one or more of these reactions and may interact to produce otherwise unanticipated synergistic toxicity. The chemical hazards include exposure to or ingestion of arsenic, asbestos, beryllium, cadmium, lead, chromium, inorganic nitrates and nitrites, toxic chemicals in fungi and plants, industrial emissions of carbon monoxide, sulfur oxides, nitrogen oxides, hydrocarbons, and particulates, and synthetic chemicals.

27934

APTIC NO. 49849

Hecker, Lawrence Harris

HAIR AS AN INDEX OF MERCURY AND LEAD EXPOSURE. *Michigan Univ., Ann Arbor, Thesis (Ph.D.)*, Ann Arbor, Mich., Univ. Microfilms, Inc., 1972. 362p. 116 refs.

The use of mercury concentration in human hair as an index of exposure to mercury as studied in four different populations by comparing hair mercury levels to blood and urine mercury levels, and the use of mercury and lead hair levels as indices of differential airborne mercury and lead exposure in the intraurban environment was investigated in a fifth group. An investigation of 147 unexposed subjects allowed no significant relationship between the mercury level of the blood and that of the urine to be derived. The best linear relationship between blood and hair can be expressed by the y equals $-0.59 + 2.41x$ equation, and the best relationship between urine and hair is described as y equals $1.064 + 0.053x$. A study of 137 Yanomamo Indians from Venezuela, not known to have been exposed to unusual mercury contamination, permitted only reinforcement of the accepted normal blood level in U. S. normals of about 1.0 micrograms Hg/100 ml. No significant relationship between either blood and urine or urine and hair mercury levels could be established for a group of 72 subjects known to have ingested substantial amounts of fish that contained more than 0.5 ppm mercury. A sampling of 104 subjects employed largely in the chlor-alkali industry yielded a linear and nonlogarithmic relationship between blood and urine, and presumably between either blood or urine and exposure, coupled with the nonlinear, logarithmic relationships between blood and hair and urine and hair, which indicates that the mechanisms responsible for the deposition of mercury in hair following an inorganic exposure are nonlinear with respect to blood level, urine level, transport, excretion, and exposure to mercury. These functions are better expressed as dependently log transformed polynomials. Unlike lead concentrations, mercury concentrations in washed hair floor sweepings collected at neighborhood barber shops can reflect intraurban differences in particulate mercury air levels.

27935

APTIC NO. 49288

Honma, Katsunori

LUNG RETENTION RATE OF HEAVY METAL AEROSOLS. (*Jikinzoku eazozoru no hainai chinchakuritsu*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 198. (Nov. 7-9, Paper 153.)

Using experimental equipment for producing heavy metal aerosols, various size spherical lead aerosols (specific weight 11.3) and tellurium aerosols (specific weight 6.2) were created, and the effects of specific weight on the rate of metal deposit in the lung were examined. The experiments were conducted using rats. The inhalation equipment was made of a high frequency heating fume producer, an aerosol exposure chamber, and an aerosol concentration meter. The exposure time was 90 min. The deposit was examined by dissection of the lungs and bronchi, and by analyses of atomic absorption spectrophotometry after treating the lungs and bronchi in nitric acid and hydrogen peroxide. Both lead and tellurium deposits were smaller as their particle sizes grew larger. The generally

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accepted idea that the lung deposit quantity is controlled by inertia is not altogether accurate.

27936

APTIC NO. 49409

Igarashi, M.

THE EFFECT OF PHOTOCHEMICAL SMOG AND ITS PRESENT REGULATIONS. (Kokagaku sumogu sono eikyo to taisaku no genjo). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 16:3-10, Dec. 1972. 9 refs.

In photochemical smog, nitrogen oxides and hydrocarbon in the air form substances like ozone, nitrogen dioxide, peroxyacetyl nitrate, formaldehyde, and acrolein. Ozone and PAN and its homolog are called photochemical oxidants. The effect of photochemical oxidants on the human body is that they stimulate eyes; there is a mutual relation between oxidant concentration and degree of stimulation on eyes. Nitrogen oxides and organic matter, especially aromatic hydrocarbons, cause eye irritation. When the air contains over 0.25 ppm of oxidants, asthma attacks increase. In Japan, hydrocarbons from vehicle exhaust emissions are regulated. Other regulations to prevent smog are outlined.

27937

APTIC NO. 49547

Irving, F. A.

SEASONAL CYCLES IN DISEASE. A REVIEW OF THE PRINCIPLES, INCLUDING THE QUESTION OF SMOG. Preprint, 5p., 1972. 3 refs. (Presented at the International Convention on Civilization Diseases, Nutrition, Environment, Living Conditions, 18th, Berlin, West Germany, Sept. 16-23, 1972.)

The general principles of seasonal cycles in diseases including hay fever, malaria, gastric infections, heart attack and, rheumatic pains, are examined from widely differing aspects. The disease cycles are a function of the weather and their extreme regularity is noted throughout the Northern and Southern Hemispheres alike, irrespective of distance and the transmission of infection. Consequently, the annual cycle of disease is not due directly to the season but is a function of it. The infection or other causative factor is already present everywhere and it is only when local circumstances become favorable to it that a disease will appear in noticeable or epidemic proportion. Similarly, heart and lung failures follow a seasonal cycle as a function of the accumulation of seasonal factors favoring the disease, and have their peaks when these factors outweigh the resistance factors of the individual against these diseases. Investigations were made into the preferred diets of 22 cases of heart and circulatory failure in Oct. 1968, not in time of a smog. Food intakes with an alkalinity of some five times the optimum and a biochemical oxygen demand of over twice the optimum were found. The pollution value of the diet is of importance in cases of heart and lung failure at all times as well as in times of smog.

27938

APTIC NO. 49368

Kaneko, Fusa and Michio Oka

EXCESS DEATH BY AIR POLLUTION IN OSAKA CITY (IV). HEAVY SMOG AND DEATHS IN OSAKA, DECEMBER 1970. (Taiki osen ni yoru shibosha-su zodai ni tsuite (daiyonho), 1970-nen 12 gatsu renzoku konodo sumoggu hasseiji no Osaka shinai shibosha no hendo). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 215. (Nov. 7-9, Paper 169.)

The mortality fluctuation affected by high concentration smog is examined. The birth dates, dates of deaths, places of deaths, addresses, and causes of deaths were collected from the data of various health centers in Osaka Prefecture in Dec. 1970, and statistics were taken on the places of deaths and dates except for accidental deaths. The causes were classified into three categories: circulatory system, respiratory system,

and others. The data on the temperature, humidity, wind velocity, sulfur dioxide counts, and suspended particulates counts from the same period were gathered from the Osaka Prefectural Weather Bureau and Air Pollution Monitoring Stations, and 24-hour averages were taken as daily air pollution indexes. The air pollution index between the 1st and 15th of December remained normal, but began to rise drastically on the 16th and stayed at a high level until 21st. Peaks of SO₂ (0.198 ppm) and suspended particulates (0.58 mg/cu m) were reached on the 17th. The death rate gradually increased during this 6-day period. The mortality average for the preceding 15 days was 45/day, but that for the six days was 50.2. The highest mortality was 58 on 21st. The mortality by age groups showed an unusual increase in the less-than-one-year-old group, increasing from 1.7 to 2.7 between the 16th and 21st. However, the mortality rates by causes showed that there was no particular increase for deaths by respiratory diseases. There was a slight increase among the circulatory patients. A significant increase in mortality was noted among heart patients, especially among the patients with B26 chronic rheumatic hearts and congenital abnormalities of the heart.

27939

APTIC NO. 49295

Kanzaki, Aiko, Tadao Meguro, and Kaname Nukada

THE RESULTS OF A HEALTH SURVEY OF INHABITANTS IN OKAYAMA PREFECTURE. (Okayama-ken ni okeru jumin kenko chosa no gaikyo). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 212. (Nov. 7-9, Paper 166.)

Epidemiological and clinical studies were made of the inhabitants of Okayama prefecture. The epidemiological study consisted of the Fletcher questionnaire and the CMI consciousness tests; the clinical study included height and weight tests, urine test, blood pressure, internal function tests, cardiography, lung function tests, and X-ray tests. All the medical associations supplied information about respiratory patients. The epidemiological examination was given to women between 40 and 69 inhabiting the Prefecture, and the clinical examinations were given to a random 20% of the females between 40 and 59 in the area. The rates of complaints ranged from 6.9% to 20.9% in eight localities; the highest ratio came from the Mizushima area. Some lung function abnormalities were found in that area. But the congestion and mixed types of pulmonary irregularities were found mostly in Okayama, Mizushima and Bizen.

27940

APTIC NO. 49131

Kaplan, Martin

ENVIRONMENTAL HAZARDS FOR HUMAN HEALTH.

World Health, 1972: 4-11, 1972.

Environmental hazards to human health are discussed. Air pollutants reviewed include sulfur oxides, smoke, airborne particulates, ozone, carbon monoxide, lead, asbestos, and beryllium. Possible effects to human health include the aggravation of existing respiratory and cardiovascular disorders, impairment of breathing, eye irritation, asthmatic effects, lead poisoning, and beryllium poisoning. Toxicity, delayed toxic effects, and the determination of long-term effects of low-level exposure to chemicals is discussed. Social and cultural conditioning in relation to mental health and the effects of pollutants on mental health are considered. The World Health Organization's environmental health monitoring network is also mentioned.

27941

APTIC NO. 49366

Kawai Kiyoyuki, Koyu Nozaki, Yoshimi Matsumura, and Kazuo Fukuda

EXPERIMENTAL INHALATION OF HEAVY OIL COMBUSTION GASES. NO. 2. RESPIRATORY LESIONS BY SHORT TERM EXPOSURES. (Juyu nensho seiseibutsu kyunyu jikken, dainiho. Tanki jikken ni kokyuki byohen). Text in Japanese. Japan Society of Air Pollu-

tion, *Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 207. (Nov. 7-9, Paper 162.)

Animal experiments were conducted to see the effects of inhaling oil combustion gases. Rats were divided in three groups. The first inhalation group was exposed to a relatively high concentration of combustion gas; the control group was raised in natural environment for 32 days in winter. In the second experiment, the first group was given the total combustion gas, the second group was given filtered smoke, and the control group was given nothing for 105 days in the winter. All the rats were dissected and the lesions in the respiratory system were examined. The rats that had inhaled the total smoke had, in both experiments, developed severe cases of pharyngitis, bronchitis, lung and lung area lymphatic carbon pneumoconiosis, alveolar emphysema, and diffuse fibrosis. The first experiment inhalation group especially developed an abnormal increase of epithelial lesions in the upper trachea. The group that inhaled filtered smoke developed fewer respiratory irregularities, and there was no abnormal epithelial increase. No carbon pneumoconiosis developed. This observation suggests that much of respiratory damage by air pollution is caused by particulates of carbon and dusts. The combustion gases included particulates, sulfur dioxide, carbon monoxide, and nitrogen oxides.

27942

APTIC NO. 49846

Khikmatullayeva, Sh. S.

STUDY OF THE REFLEX AND RESORPTIVE EFFECTS OF THIOPHENE. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Third Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants.* M. Y. Nuttonson (ed.), Vol. 15, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 46-56. 15 refs. Translated from Russian. (Also: Vypusk II, *Izdatel'stvo Meditsina, Moskva*, p. 120-132, 1968.)

NTIS: PB 211074

The reflex and resorptive effects of thiophene on the human body were studied in a series of physiological, hematological, and biological tests. The threshold and subthreshold concentrations for olfactory perception were 2.1 and 1.9 mg/cu m, respectively. The thiophene concentration acting on the light sensitivity of the eyes was below the threshold of olfactory perception at 1 mg/cu m; the inactive concentration was 0.8 mg/cu m. Changes in the bioelectric activity of the cerebral cortex were determined during inhalation of thiophene vapors at a concentration of 0.8 mg/cu m; thiophene at 0.6 mg/cu m was inactive. Concentrations of 20 and 3 mg/cu m effected physiological, hematological, biochemical, and pathomorphological changes; a concentration of 0.6 mg/cu m was judged inactive. The highest single and mean daily concentration of thiophene is proposed at 0.6 mg/cu m.

27943

APTIC NO. 49286

Kitabatake, Masayoshi, Katsumi Yoshida, and Masayuki Imai

EFFECTS OF SULFUR OXIDES ON EXPERIMENTAL ASTHMA ATTACKS OF GUINEA PIGS. (In *sankabutsu no morumotto jikken zensoku ni oyobosu eikyo ni tsuite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 222. (Nov. 7-9, Paper 176.)

Three groups of 12 guinea pigs each were exposed to sulfur dioxide plus sulfur trioxide plus albumin, SO₃ and albumin, or albumin only, for thirty minutes each time. Total body plethysmography was applied, and the breathing difficulty was examined. In both experimental groups, with each increase of exposure, the degree of breathing difficulty increased; the rate of increase was especially great with the group inhaling SO₂ and SO₃. After the fourth inhalation, the two experimental groups showed a drastic increase curve of breathing difficulty on the plethysmograph, compared to the control group with albumin only. In both experimental groups, the danger rate was

5%. The effects of SO₂ and SO₃ on asthmatic attacks, simulated by albumin sensitization, were definitely positive and harmful.

27944

APTIC NO. 49723

Nelson, John H., Richard J. Johnson, Frederick Coulston, Leon Golberg, and Travis Griffin

KINETICS OF RESPIRATORY LEAD UPTAKE IN HUMANS. Preprint, 10p., 1972. 14 refs. (Presented at the International Symposium on Environmental Health Aspects of Lead, Amsterdam, Netherlands, Oct. 2-6, 1972.)

Biological effects of long-term human exposure to airborne lead were studied. Adult male subjects were exposed to airborne lead particles of respirable size. Two exposures were conducted, with each exposure lasting about 18 weeks. Air lead levels in the experimental room were recorded twice daily; blood lead levels were determined once every one or two weeks. Changes in blood lead during exposure were compared to the mean blood lead before exposure to calculate mean increase in blood lead. Potential increase in body burden was computed as a function of exposure level, duration of exposure, pulmonary ventilation, and percent retention of inhaled lead. The increase in blood lead was closely related to the logarithm of potential body burden. A mathematical model of the kinetics of respiratory lead uptake was developed from the data, which enables the computation of the probable change in blood lead concentration and the relationship between total blood lead and potential body burden for any set of exposure conditions. (Author summary modified)

27945

APTIC NO. 49269

Kodama, Masushi, Eisaburo Kunitake, Koichi Nobutomo, Tomoko Urabe, and Shin Ishinishi

STUDIES ON THE RELATIONSHIP BETWEEN THE CONCENTRATION OF LEAD IN THE BLOOD OF NORMAL ADULTS AND THEIR ENVIRONMENT (I). (Taikichu namari nodo to ketsuchu namari ryo ni kansuru kenkyu (I)). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 205. (Nov. 7-9, Paper 160.)

The effects of lead in the environment from automotive exhausts on the lead content of human blood were examined. Forty-five people who have lived in a heavy traffic area for the past 3 years and who work daily in the same environment, 55 inhabitants in the adjacent residential area, 43 workers of printing factories, 34 workers in underground parking lots, and 56 inhabitants of an unpolluted island in Okinawa were examined. Their blood (10 ml each) was analyzed by the dithione method. The environmental lead content was measured at each area by the hi-vol air sampler with a glass fiber filter. One fourth of the filter paper was burned by sulfuric acid and nitric acid distillates and atomic absorption spectrophotometry was applied. The lead content in the air was in the range of 5.65 and 0.16 micrograms/cu m and was within the maximum allowable concentration in all areas. The lead content in the blood of all the workers were within the normal lead content range of the Japanese people.

27946

APTIC NO. 49367

Kusumoto, Shigeko, Yasuko Tsubota, Etsuko Yonekawa, Yasutomo Nakashima, and Masaharu Kubo

THE EFFECTS OF OZONE OR PHOTOCHEMICAL OXIDANTS ON THE LEUKOCYTES AND ALKALINE PHOSPHATASE OF MICE. (Ozon oyobi kokagaku okishidanto bakuro mausu no hakketsukyu narabini arukari hosufataze no hendo ni tsuite). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 197, 1 ref. (Nov. 7-9, Paper 152.)

Animal exposure experiments were conducted to see the fluctuation of leukocytes, the neutrocytes/lymphocyte ratio, and plasma alkaline phosphatase phenomena which were noted in

the victims of photochemical smog in Aug. 1971. Mice raised in clean chambers were used for both experimental and control groups. One to 1.5 hr exposures were repeated in exposure chambers where ozone was supplied by a discharge ozone producer and oxygen. Mice were exposed to 3 plus or minus 0.5 ppm ozone for 3 to 3.5 hr; then their blood was examined 5, 15, and 25 hr after the exposure. The increase of erythrocytes was noted up to 5 hr, then returned to the level of the control group. Leukocytes showed no change up to 5 hr, but after 15 hr, they began to increase. The ratio of neutrocytes and lymphocytes showed some fluctuation in the 5-hour group, but there was no relationship with the number of leukocytes. The decrease of erythrocytes was recognized in a long-term exposure group (3 mo, 2-3 hr daily for 5 days a week), and the neutrocyte/lymphocyte ratio showed a tendency to rise. The plasma alkaline phosphatase tended to be lower immediately after exposure, but returned to normal 5 hr later.

27947

APTIC NO. 49560

Lawther, P. J.

RECENT RESEARCH ON THE CLINICAL EFFECTS OF AIR POLLUTION. *Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA*, Basel, Switzerland, 1971, p. 155-162, 1972. 13 refs.

The relationship between illness, death, and air pollution in London has been studied for many years. As a result of the implementation of the Clean Air Act in 1956 and of the changing habits of fuel usage, pollution by smoke has declined in a spectacular manner. Sulfur dioxide has also decreased, but the reduction in mean values has been less dramatic than the fall in concentrations measured over short periods. There is some evidence that the relationship between morbidity, mortality, and pollution is diminishing. These trends may be due to the infrequency of periods of high pollution as a result of improvement in the weather, however, hopefully the beneficial effect on health is real. Several epidemiological surveys, laboratory studies, and mortality and morbidity studies are discussed. (Author abstract modified)

27948

APTIC NO. 49562

Lob, M.

LEAD POISONING - REALITY OR HYPOTHESIS OF THE RISK BY AUTOMOBILE EXHAUST GASES. (*L. intoxication par le plomb. Realite ou hypothese du risque provoquer par le plomb des gaz d echappement*). Text in French. *Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA*, Basel, Switzerland, 1971, p. 185-198, 1972. 35 refs.

Lead absorption, elimination, storing, and toxicity are discussed. Health hazards include illness (obvious intoxication), biochemical disturbances, and toxic symptoms. Lead is added to gasoline to improve gasoline combustion and reduce fuel consumption. However, the resulting lead emissions from engine exhausts may cause toxic quantities of lead in the atmosphere. Concentrations have been measured at less than 5 micrograms/cu m in America and Europe. The toxic limit value is 200 micrograms/cu m, and the maximum allowable concentration suggested by German authorities is 10 micrograms/cu m. Lead content in foods is increasing as a consequence of Pb deposits on the surface of plants near roads. However, there have been no cases of obvious intoxication of human beings from atmospheric lead except for occupational exposure. The lead content in the blood for about 25 years has averaged 20-30 micrograms %. Lead seems to accumulate more in the organs of individuals living in heavily polluted areas than in nonpolluted areas. Lead exposure results in a weakening of delta-aminolevulinic acid dehydratase. While there is presently no cause for alarm regarding atmospheric lead concentrations, automobile traffic is increasing, so lead-free gasolines should be developed.

27949

APTIC NO. 49430

Maruya, Hiroshi and Shinichi Yoshima

CHRONIC OBSTRUCTIVE LUNG DISEASES AT KYODO HOSPITAL IN MIZUSHIMA. REPORT 1. STUDY ON THE RELATIONSHIP OF THE AGE AND AIR POLLUTION. (*Mizushima chiku K byoin ni okeru mansei heisoku haikan. Daiippo. Taiki osen to hassho to nenrei no kento*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 208. (Nov. 7-9, Paper 163.)

The age distribution of chronic lung obstructive diseases in the Mizushima area were examined. Of the total 326 patients who received diagnoses between Jan. and June 1972, records were examined retrospectively to see the ages of their initial attacks and histories, and were compared with the total sulfur dioxide emission in the Mizushima industrial area. The yearly transition of morbidity and the amount of emission gases in Mizushima had a definite correlation. The total number of asthmatic bronchitis cases was 32.5% of the total patients, and of them, 68% were between 0 and 4 years of age, and 86% were between 0 and 9 years. Asthma cases were 30% of the total patients, and there was no age significance. Chronic bronchitis cases were 30%, and the morbidity increased from the age group of 20s on up and reached a peak in the group of 60s. Emphysema cases were 7.3%, mostly in the old age group above 50 years. Among the 98 bronchial asthma patients, nine were preceded by asthmatic bronchitis, and seven out of nine were children less than 10 years of age. Air pollution seemed to increase and reinforce morbidity factors.

27950

APTIC NO. 49969

McIntire, Matilda S. and Carol R. Angle

AIR LEAD/BLOOD LEAD IN G-6-PD DEFICIENT BLACK SCHOOL CHILDREN. *Preprint*, 12p., 1972. 28 refs. (Presented at the International Symposium on Environmental Health Aspects of Lead, Amsterdam, Netherlands, Oct. 2-6, 1972.)

The effect of urban sources of air lead on the concentration of lead in the red cells and whole blood of normal and glucose-6-phosphate dehydrogenase (G-6-PD) deficient black school children was investigated. Forty-four children at two elementary schools within 0.7 mi of a battery plant had significantly higher (p less than 0.001) blood levels (34.2 + or 9.7 microgram %, mean and SD) than 122 students (26.2 + or 7.1) living 0.7-4 mi away. Comparable differences were determined in red cell lead 5 mo later, although composite air lead monitored at a site 0.7 mi downwind from the plant was not increased above the urban level. Independent of the effect of location, G-6-PD deficient children had higher blood lead levels (p less than 0.005) and higher red cell lead levels (p less than 0.001), after standardization to a hematocrit of 38%, than the non-deficient children. An increased red cell lead level with hypochromia was independent of geographic exposure or enzyme deficiency. (Author abstract modified)

27951

APTIC NO. 49287

Meguro, Tadao, Aiko Kanzaki, and Kaname Nukada

EVALUATION OF RESPIRATORY RESISTANCE AND SPIROGRAM FOR MASS SCREENING EXAMINATION. (*Shudan kenshin ni okeru kokyu teiko oyobi su-pairguramu no hyokaho*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 213. (Nov. 7-9, Paper 167.)

The results of spirometry and breathing resistance tests in a mass health examination were used to detect the geographical differences due to air pollution for lung congestion. The records of 769 women between 40 and 59 years old in five areas of Okayama Prefecture (eight cities or townships) were examined. Ventilation functions, respiratory resistance, and forced expiratory volume were checked. The numbers of mixed and congestive types of lung irregularities were slightly

higher in Okayama city, Kurashiki-Mizushima, and Bizen, compared to the numbers in rural villages and non-polluted cities. The ratio of more than 3.0 cm H₂O/l sec breathing resistance was high in Mizushima and Bizen. The Mizushima area showed a little lower index for the forced expiratory volume test. Those who had more than 70%/sec FEV can be considered as having an innate slight case of lung congestion. Relatively high numbers of such cases were found in Mizushima and Bizen, and particularly high numbers of sensitized air passages were found in those areas.

27952

APTIC NO. 49370

Mishima, Masao, Masaharu Hitosugi, Kiyofumi Ishikawa, and Takeo Suzuki

STUDIES OF COHB AND LEAD IN BLOOD ON THE GENERAL PUBLIC. (*Ippan jumin no ketsuchuen oyobi CO-Hb no chosa*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 204. (Nov. 7-9, Paper 159.)

The lead and carboxyhemoglobin content in the blood of inhabitants of Soka, Saitama Prefecture were measured in order to see the effects of air pollution on the human body in small cities, and the results were compared with those of Tokyo policemen. Occupations were varied, but the areas of their work were mostly in the city; the places of birth, past history, and job history were mostly within the same area. The total of 142 persons, including 39 males between 30 and 76 years of age and 103 females between 30 and 74 years of age, were given a questionnaire. Their ages, occupation, past history, and amount of smoking were asked. Suspended particulates were collected by high-vol air samplers, and carbon monoxide was sampled by mylar bags. The CO was measured by the infrared spectrometry. The lead content in suspended particulates varied between 1 and 5 micrograms/cu m in the non-polluted and moderately polluted areas, and more than 6 micrograms/cu m in highly polluted area. The average lead content in blood was up to 15 micrograms/dl. This compared with up to 20 micrograms/dl of the Tokyo policemen. The CO-Hb content averaged about 1.8%. Compared to the statistics of Tokyo, no special effect of air pollution was noted either in the lead content or in the CO-Hb count. However, the comparison between smokers and nonsmokers showed COHb of 2.6% against 1.2%.

27953

APTIC NO. 49745

Miyaji, K.

YOKKAICHI-ASTHMA. (*Yokkaichi Zensoku*). Text in Japanese. *Rinsho Seijinbyo (J. Adult Diseases)*, 2(5):543-549, May 1972. 7 refs.

Several petroleum refineries in Yokkaichi have increased air pollution in the city and increased asthmatic diseases. Outlying areas have also had increased air pollution, due to seasonal wind; for instance, a neighboring village had 0.5-1.0 ppm of sulfur dioxide for a few to over 10 hours. Higher stacks and the use of better fuels has decreased the amount of pollution but increased the affected area. The city now pays doctor fees for air pollution-related diseases (bronchial asthma, chronic bronchitis, asthmatic bronchitis, and pulmonary emphysema). Sulfur dioxide, nitrogen dioxide, ammonia, hydrogen chloride, formaldehyde, and aliphatic aldehydes are officially recognized pollutants; paraffins, olefins, aldehyde derivatives, ketones, and alcohols are officially recognized odorants. All of these pollutants are derived from the petroleum industry. From 1965 to March 1971, 947 patients were designated as air-pollution victims. Existing patients on Nov. 30, 1971 included 441 bronchial asthma patients, 279 chronic bronchitis patients, 171 with asthmatic bronchitis, and nine pulmonary emphysema patients. Peak occurrences of disease occur at 11 years old and between 40 and 60 years old. Of the 100,000 inhabitants of the district, 800 have been designated as air pollution victims and another 1500 should be so designated. Yearly disease trends, relationships between respiratory disease and age,

characteristics of Yokkaichi asthma and its allergenic basis, and the use of bronchodilators are also discussed.

27954

APTIC NO. 49411

Mizoguchi, Isao, Kuniyoshi Makino, Yasuhito Sato, Nobuyoshi Osawa, Midori Chigusa, and Hiroshi Nonaka

A STUDY OF FACTORS OF EYE IRRITATION IN PHOTOCHEMICAL SMOG. (*Kokagaku sumoggu ni okeru gan shigeki sayo no ins'i ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 202. (Nov. 7-9, Paper 157.)

Various factors for eye irritation caused by photochemical smog were examined. Automotive exhaust gas was irradiated with ultraviolet rays in a smog chamber. Oxidants, hydrocarbons, nitrogen oxides, peroxyacetyl nitrate temperature, and humidity were measured. The eye irritation rate was measured and analyzed statistically. The amount of ultraviolet rays was changed, and irritation rates were measured. One hundred microwatts of ultraviolet caused 5.9% eye irritation; 300 caused 11.1%, and 500 caused 13.0%; 500 microwatts is equivalent to one half of the amount of ultraviolet rays in the midsummer sun. Close to normal correlations were recognized between eye irritation and oxidant concentration, hydrocarbon concentration, peroxyacetyl nitrate, and temperature. The concentration which caused eye irritations to 30% and 70% of people were: oxidants 0.15 and 0.31 ppm; HC, 5.45 and 11.8 ppm; PAN 0.61 and 1.64; and temperature, 30.4 and 33.4 C, respectively. There was no correlation between eye irritation and nitrogen oxides, and there was a close to reversed correlation between eye irritation and humidity. The complexity of various factors in photochemical reactions is further discussed.

27955

APTIC NO. 49580

Nagata, Minoru

EPIDEMIOLOGICAL STUDIES ON ESTIMATION OF HUMAN DAMAGES PRODUCED BY AIR POLLUTION. 1. PULMONARY FUNCTIONS OF SCHOOLCHILDREN IN TWO AREAS OF GUNMA PREFECTURE WHERE SUFFICIENT DATA ON CHEMICAL DETERMINATION OF CONTAMINANTS ARE UNAVAILABLE. (*Taiki osen ni yoru jintai higai suitei no ekigakuteki kenkyu. Daiippo: Osen busshitsu no kagakuteki sokutei shiryo ga fujubun naru Gunma-ken ka ni chiku no gakudo kenshin seiseki*). Text in Japanese. *Kita Kanto Igaku (Kitakanto Med. J.)*, 22(1):49-64, Jan. 1972. 19 refs.

The effect of air pollution on human health was investigated during a series of mass examinations of pulmonary function in schoolchildren in areas with chemical processing plants (area A) and a refinery (area B). In schoolchildren of area A, the mean forced vital capacity and timed vital capacity values were significantly lower than that of the control group for both sexes and all age groups except 12. With regard to the peak flow rate, a significant difference was determined only in the 6 to 7-year-old age group. For the schoolchildren in area B, each observed value was generally lower than that of the controls; the forced vital capacity and timed vital capacity values, however, were significantly different, for the 11-year-old group. Restrictive and obstructive impairments were significantly prevalent in the children of area A.

27956

APTIC NO. 49581

Nagata, Minoru

EPIDEMIOLOGICAL STUDIES ON ESTIMATION OF HUMAN DAMAGES BY AIR POLLUTION. 2. STATISTICAL PROCEDURE ON VALUES OBTAINED IN MASS EXAMINATION OF SCHOOLCHILDREN FOR PULMONARY FUNCTION. (*Taiko osen ni yoru jintai higai suitei no ekigakuteki kenkyu. Dainiho: Gakudo hai kino shudan kenshin ni okeru sokuteichi no shori ni tsuite*). Text in Japanese. *Kita Kanto Igaku (Kitakanto Med. J.)*, 22(2):99-108, March 1972. 14 refs.

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The results of pulmonary function examinations of children in a polluted area and a non-polluted area, with respect to forced vital capacity (VC) and timed vital capacity (FEV 1.0) were statistically computed. The comparative results determined no difference in VC, no matter the observed or relative values. For FEV 1.0, however, a clear difference was determined according to the observed values of the percentage used. In extreme cases, the evaluation was even reversible by using the percentages, with the higher values for the polluted area. The significant level of correlation between FEV 1.0 and %FEV 1.0 was P equals 0.1.

27957

APTIC NO. 49606

Nakajima, Yasutomo

PHOTOCHEMICAL SMOG AND ITS COUNTERMEASURES. (*Kokagaku sumoggu to sono taisaku*). Text in Japanese. Kyoto Igakkai Zasshi (J. Kyoto Med. Assoc.), 22(1):65-79, Sept. 1972. 12 refs.

The effects of ozone in the atmosphere on the human body begin to appear at about 0.1 ppm concentration. A 30-60 minute exposure will result in eye irritation, the lowering of lung function for chronic respiratory patients, a decline of records for long distance runners; with a cumulative concentration of 0.13 ppm with a 1-hour average of 0.05 to 0.06 ppm, the frequency of attacks for asthmatic patients will increase; at 0.3 ppm, irritations of the nose and pharynx is felt; the hour average of 0.2 to 0.7 ppm will cause worsening of chronic respiratory diseases; an exposure to 0.6-0.8 ppm of ozone for 2 hours will cause deterioration of the entire respiratory function. The 12 patients who were seriously affected by the smog of Aug. 27, 1971 in the Osaka area were examined. In addition to the conscious symptoms such as tears, pain in the chest, headache, nausea, and numbness, clinical tests showed a slight temperature, palpitations, fast pulse, flushing of the face, bloodshot eyes, reddening of the pharynx, swollen vocal cords, breathing difficulty, and tongue fur. Experiments on animals showed that a drastic exposure causes a rapid increase of leucocytes and neutrocytes and a decrease of lymph cells. The 12 patients were examined, and only the boys showed an extraordinarily high leuco index. All the indexes were back to normal 60 or 70 days later when a followup check-up was given. The effects of chronic exposure, eye irritation brought about by aromatic hydrocarbons, first aid for smog effects, and the need for control measures and standards are briefly discussed.

27958

APTIC NO. 49620

Nakamura, Seiichi, Yumiko Nakayama, and Takeo Miura

EFFECTS OF AUTOMOTIVE EXHAUSTS AND PHOTOCHEMICAL OXIDANTS ON MICE. (*Jidosha haiki gasu oyobi kokagaku okishidanto no seitai ni oyobosu eikyo*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 196. (Nov. 7-9, Paper 151.)

The effects of automotive exhausts and photochemical oxidants on leukocytes and on the self-defense mechanism of the lung were examined on mice. Ninety three-week old mice were exposed to 40-60 ppm carbon monoxide and 0.1-0.6 ppm oxidant for 2 hr/day, 4 days a week for 9 weeks. There was no difference in the growth rate among the CO exposure group, the oxidant exposure group, and the control group. A normal mouse has 5000-6000/cu m leukocytes; after 4 days of exposure, in both exposure groups the leukocytes decreased to 4000/cu mm. But they returned to the normal rate 3 days after the exposure stopped. After 5 and 9 weeks of exposure, the oxidant exposure group's lymphocytes decreased and neutrocytes increased. The CO exposure group did not show much difference from the control group. The lung capacity to reject foreign objects was examined using a radioactive metal colloid. Water containing a metal colloid was atomized and given to mice, which had already been exposed to the gases for 9 weeks. After 10 min of inhalation and 15 min of interval, the mice were killed and the radioactivity of the lungs was ex-

amined. The reduction rate of the foreign matter was examined. The rejection capacity of the mice exposed to CO was the same as that of the control group. The group exposed to oxidant showed deterioration of rejection capacity.

27959

APTIC NO. 49408

Niimi, Masayoshi

THE RESULTS OF AN ENVIRONMENTAL INSPECTION CONDUCTED FOR FACTORIES AND ENTERPRISES IN THE KANTO AREA. (*Kanto-chiiki ni oite jissai shita kajo, jigyocho no kankyocho no kekka yori Dai 3po*). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 19(10):431, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

The comparison of environmental hygienic situations and the results of special health checkups for employees with harmful occupations was studied for respective regional facilities under the following conditions. The National Association for Welfare of Laborers conducted the investigation at the request of factories and enterprises. Thus, it is appropriate to compare the mere results of the terms because the object facilities of the special health checkup and those of environmental inspections are not necessarily consistent. The number of inspected items, however, is comparatively great, so the relation of the both terms is much closer to the actual situation. A comparison of the rate of close examination required by special health checkups for the respective areas Tokyo, Kanagawa, and Chiba was made. The rate of inappropriate occupations exceeding the allowable degree was established. The appearing rate of examinee requiring close check-ups at inappropriate occupations for each harmful condition was obtained. At each of the harmful conditions, the appearing rate of the close examination required under the occupations is in the order of Tokyo, Kanagawa, and Chiba.

27960

APTIC NO. 49293

Nobutomo, Koichi, Yasushi Kodama, Eisaburo Kunitake, Tomoko Urabe, and Shin Ishimishi

A COMPARATIVE STUDY OF PULMONARY FUNCTION OF RESIDENTS IN FUKUOKA AND OMUTA. (*Fukuoka-shi oyobi Omuta-shi ni okeru haikino ni kansuru chosa*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 210. (Nov. 7-9, Paper 165.)

Citizens of Fukuoka and Omuta were given lung function tests to see the possible effects of air pollution. Forced expiratory volume, pulmonary expiratory resistance, and maximum breath control, were calculated. Each individual's sex, age, and height were applied to get the standard second index and the standard second rate; the differences from the actual measurements were examined. The lung capacity differences are presented by age groups. The vital capacity of people in their 30s was 109.1 in Fukuoka and 196.4 in Omuta; people in their 40s, 108.1 in Fukuoka and 106.6 in Omuta; 50s, 99.0 in Fukuoka and 97.5 in Omuta; 60s, 99.4 in Fukuoka and 97.7 in Omuta. The difference was not significant enough to attribute to air pollution.

27961

APTIC NO. 49873

Nodiya, P. I.

STUDY OF THE BODY COBALT AND NICKEL BALANCE IN STUDENTS OF TECHNICAL TRADE SCHOOLS. (*Izucheniye balansa kobal ta i nikelya v organizme uchashchikhsya PTU*). *Gigiena i Sanit.*, 37(5):108-109, 1972. Translated from Russian, 4p.

Cobalt and nickel metabolism was observed in 10 17-year-old student blacksmiths. The students received, on the average, 31.05 and 288.5 micrograms of cobalt and nickel/day, respectively. About 70 to 76% of the total amount of cobalt taken into the body with food was eliminated with feces (18.01-25.31

micrograms), while 24-30% was eliminated with urine (4.65-9.49 micrograms). From 87.1-90% of the total amount of nickel taken in with food was eliminated with feces (218.77-278.07 micrograms), while 10-11.2% was eliminated with urine (27-63-31.29 micrograms). The daily cobalt balance was above 1.27 micrograms for all 10 students; the daily nickel balance was above 1.58 micrograms. Based on these results, 30-33 micrograms of cobalt and 280-310 micrograms of nickel in the daily ration cover the requirements of the juvenile body for these trace elements. Nickel was estimated to be absorbed from food in the amount of 10.7% and cobalt in the amount of 22.7% more.

27962

APTIC NO. 49426

Nose, Yoshikatsu

THE RELATIONSHIP BETWEEN AIR POLLUTION AND RESPIRATORY DISEASE OF PUPILS IN ONODA CITY. (*Onoda-shi no taiki o sen to gakudo no kokyuki shikkan*). Text in Japanese. Yamaguchi Sangyo Igaku Nenpo (Annu. Rept. Soc. Yamaguchi Ind. Health), vol. 18:63-67, March 1972.

The pattern of air pollution in Onoda city between 1960 and 1968 indicates that during the period in which coal was the main fuel, there was 20 to 22 t/sq km/mo of dust, but after 1964 when the fuel was switched to oil, the dust decreased to 15 to 17 t/sq km/mo. The high mortality of infants and old people from pneumonia, bronchitis, asthma, and heart disease gradually decreased. But the respiratory diseases (bronchitis, asthmatic bronchitis, and asthma) of school children are still increasing. Compared to the frequency of deaths during the early 1950s, the mortality from pneumonia in the mid-1960s decreased by 24%, bronchitis by 54%, asthma 40%, and heart disease by 20%. The deaths by bronchitis decreased by the same proportion as the decrease of settling particles, but the mortality from asthma decreased by a smaller proportion, similarly to the rate of the decrease of soluble materials in settling particles. In other words, bronchitis deaths had much to do with the dust pollution, and asthmatic deaths seemed to have a correlation with the gaseous type of pollution. The health records of all the school children of Onoda city (3616) and respiratory diseases were surveyed geographically. There was a definite linear proportion between the degree of pollution in various areas and the frequency of the children's respiratory diseases.

27963

APTIC NO. 49756

Ordóñez, Blanca Raquel

THE EFFECTS OF AIR POLLUTION ON HUMAN HEALTH. (*Los efectos de la contaminación atmosférica en la salud del hombre*). Text in Spanish. *Salud Pública México*, 14(2):209-216, March-April 1972. 38 refs. (Presented at the National Security Congress, Mexican Hygiene and Security Association, Nov. 1971.)

Effects of air pollution on human health are reviewed and illustrated by the famous accidents which occurred in London, the Meuse Valley, in the U. S., and in Japan. Meteorological (humidity, temperature inversion, solar radiation), geographical, and biological factors enhancing the damaging effects of air pollution on whole populations are discussed. Pollutants are divided into irritant and absorption agents according to their action target. Irritant pollutants can be divided into reducing (sulfur dioxide and dust particles) and oxidizing agents such as ozone and nitrogen oxides. Agents acting upon absorption include carbon monoxide, lead, 3,4-benzopyrene, polynuclear hydrocarbons, and fluorides. The action of SO₂ and dust particles on the respiratory tract is strongly interrelated, and the effect of the former is catalyzed by the latter. Both effects are enhanced by atmospheric humidity since respiratory symptoms appear to be more severe under fog conditions. Epidemiology data indicate that chronic bronchitis patients are even more susceptible to the above and to oxidizing agents. Carbon monoxide effects include formation of carboxyhemoglobin in-

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terfering with tissue respiration processes. Inhalation of larger CO amounts may cause death upon failure of the central nervous system. People suffering from heart disease or severe anemia are most susceptible to CO. Lead interferes with the hemoglobin synthesis processes and causes kidney and liver damage, fertility impairment, and mental retardation in children. Benzo(a)pyrene is known to be carcinogenic in laboratory animals and in occupationally exposed workers; however, no correlation between benzo(a)pyrene, emitted by automotive vehicles and lung cancer could be established. The lack of studies relating pollution and health hazards in Mexico is emphasized.

27964

APTIC NO. 49196

Oya, Fumihiko, Shogo Ochiai, Takashi Mukaida, Nobuaki Kadoya, Hiroshi Yanaka, and Yoshiyuki Harada

PHOTOCHEMICAL AIR POLLUTION IN KANAGAWA (NO. 1), OCCURRENCE AND DAMAGES OF PHOTOCHEMICAL AIR POLLUTION. (*Kanagawa-ken ni okeru kokagaku kogai ni tsuite (daiippo), kokagaku kogai no hassei to higai jokyō ni tsuite*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 77. (Nov. 7-9, Paper 25.)

A total of 11 photochemical emergency alerts were issued in 1971: five times in June, three times in July, and one time each in May, August, and September. The most frequent occurrences (five times) covered Kawasaki and Yokohama; Yokohama and its vicinity twice, Kawasaki alone twice, the Kanagawa Prefecture shoreline once, and the entire Prefecture once. Of the 11 alerts, seven produced some victims and once without any alert, and a total of 13,183 persons were affected. The most severe case occurred on Sept. 20 when 9977 people were affected in northern and central Kawasaki and Yokohama, between 12 noon and 3 pm. Ninety percent of the total number were elementary school and junior high school pupils, and 93.7% were all school-related children and youths. Most incidents occurred in playgrounds and other out-of-doors areas, but classrooms with open windows had some victims. Ninety percent of the victims complained of eye pain, eye irritations, tears, sore throat, dry and irritated throat, chest pain, suffocation, and headaches.

27965

APTIC NO. 49385

Paiva, Manuel

COMPUTATION OF THE BOUNDARY CONDITIONS FOR DIFFUSION IN THE HUMAN LUNG. *Computers Biomed. Res.*, 5(6):585-595, Dec. 1972. 9 refs.

The boundary conditions for diffusion in the human lung were constructed from anatomical data. The transport equation was solved, with respect to diffusional and convective transport, and the single-breath test and nitrogen washout mechanism were interpreted. Complete analytical and mathematical data are included. (Author abstract modified)

27966

APTIC NO. 49242

Pfeifer, I., P. Schmidt, and V. Kusak

CONTRIBUTION TO THE EXPLANATION OF SOME SYMPTOMS OF CHILDREN FROM AIR POLLUTED AREAS. (*Beitrag zur Erklärung einiger Befunde an Kindern aus lufthygienisch belasteten Gebieten*). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete (Berlin)*, 18(12):911-914, 1972. 8 refs.

As a contribution to the theoretical explanation of the results of an earlier examination of children from air polluted areas, a microbiological examination of the tonsils of 302 children from areas with different extents of air pollution was performed. Furthermore, the influence of the addition of hydrocortisone on the chemical resistance of erythrocytes of humans and laboratory animals was studied in vitro and in vivo. The children from the air polluted area had considerably worse tonsils than the control group. The results of the microbiological ex-

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amination of the tonsils agreed with earlier results of a clinical examination of the tonsils and the regional lymph nodes. The analysis of the influence of hydrocortisone on the chemical resistance of the erythrocytes yielded similar changes as found in children from air polluted areas. The erythrocyte was shifted to the right in the in vitro and in vivo tests, which is the same as an increase of the chemical resistance of the erythrocytes.

27967

APTIC NO. 49432

Sato, Tadao and Nobuya Inoue

AN EPIDEMIOLOGICAL STUDY OF AIR POLLUTION EFFECTS IN TSURUSAKI DISTRICT OF OITA CITY (NO. 2). (Oita shi Tsurusaki chiko ni okeru taiki osen no eikyo ni tsuite no ekigaku teki kenkyu (dainiho)). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th 1972, p. 221. (Nov. 7-9, Paper 175.)

Questionnaires were given to people for epidemiological fact findings in order to supplement the health statistics collected in the form of health insurance applications. The period covered was Jan. through Dec. 1971. Data were collected from 14,246 men and women living in polluted areas, 21,884 from areas of limited pollution, and 80,008 from unpolluted area as control group. Influenza morbidity was 19.7% among men and 18.6% among women in the polluted areas and 10.4% among men and 11.4% among women in the area of low pollution. The total percentage of bronchitis was 7.3% in the polluted area, 7.7% in the low pollution area, and 8.3% in the control areas; bronchial asthma cases were 1.4, 0.8, and 1.3%, respectively; pneumonia cases were 0.1, 0.2, and 0.5% respectively. Morbidity was higher in the control areas than in the areas of low pollution. The morbidity of polluted areas decreased since the last report which covered 1969-1970. As in the case of previous years, morbidity was higher among young people and lower among old people. Except for influenza and some bronchitis statistics, men's morbidity was higher than women's. As in the case of the previous investigation, morbidity was extremely high from winter to early spring.

27968

APTIC NO. 49132

Shin, Young Soo, Young Il Lee, Kwang Soo Cho, and Chul Hwan Cha

STUDIES OF EFFECTS ON HUMAN HEALTH BY AIR POLLUTION COMPARED WITH SEOUL CITY (LARGE CITY) AND SUWON CITY (SMALL CITY). - APPLICATION OF CORNELL MEDICAL INDEX. (Taegi oyom i shimin kongang e mi ch i nun yonghyang e kan han pigyo yon gu (Seoul tukphyolshi ui kak chiyot mich Suwonshi ui pigyo yon gu)-Cornell nihak chisu chog yong). Text in Korean. Taehan Uihak Hyophoe Chapchi (J. Korean, Med. Assoc.), 15(4):339-349, April 1972. 21 refs.

The effect of air pollution on the health of inhabitants in two Korean cities was investigated. A total of 1072 residents were interviewed by questionnaire in a three-month period about physical and psychological complaints. A list of the 12 physical items and the six psychological items on the questionnaire are included in the report. Results were broken down by the years of residence and the mean of complaints from residents in the downtown area, traffic congestion area, industrial area (all three in Seoul), and from the small city (Suwon). Complaints about eye and ear irritation, the respiratory system, cardiovascular system, digestive tract, nervous system, and fatigability were higher in the Seoul area than in the Suwon area. Sex and age of the subjects were correlated with health effects.

27969

APTIC NO. 49654

Shmutter, L. M.

THE EFFECT OF THE CHRONIC ACTION OF LOW CONCENTRATIONS OF CHLORINATED HYDROCAR-

BONS ON THE PRODUCTION OF VARIOUS CLASSES OF IMMUNOGLOBULINS.

(Vliyaniye khronicheskogo vozdeystviya malykh kontsentratsiy khlorirovannykh uglevodorodov na vyработку razlichnykh klassov immunoglobulinov). Gigiena i Sanit., 37(2):32-35, Feb. 1972. Translated from Russian. Scientific Translation Service, Inc., Santa Barbara, Calif., 7p.

The effect of the prolonged action of low concentrations of chlorinated hydrocarbons -- dichlorethane, tetrachlorethane, pentachlorethane, trichloroethylene, and tetrachloroethylene -- on the synthesis of antibodies was investigated. The effect of these toxins on various classes of immunoglobins, particularly 19S and 7S was studied. Experiments were conducted on chinchillas which were subjected to dynamic inhalation inoculation in compartments with dichlorethane (in concentrations of 2 and 10 mg/cu m), tetrachlorethane (2.10 and 100 mg/cu m), and tetrachloroethylene (10 and 1000 mg/cu m) for 8 10 mo, 3-hour exposures six times per week. All animals were immunized with an injection of heated typhoid fever vaccine. Data were statistically analyzed, with determination of the geometric mean titers of antibodies and confidence intervals. The intensity of antibody production in response to immunization was a sensitive test for studying the nonspecific effect of low concentrations of industrial poisons; chlororganic hydrocarbons in prolonged administration had a varied effect on antibody production -- from stimulation to inhibition, depending on concentration, form of the poison, and length of its application; and chlorinated hydrocarbons had a varying effect on the production of different classes of immunoglobins -- synthesis of 7S-antibodies was more resistant to the concentrations of the poisons studied. Stimulation of the production of this class of immunoglobins is most often observed.

27970

APTIC NO. 49872

Shtenberg, A. I.

NUTRITIONAL BACKGROUND AND SENSITIVITY OF THE ORGANISM TO TOXIC SUBSTANCES. (Fon pitaniya i chuvstvitel'nost' organizma k toksicheskim veshchestvam). Gigiena i Sanit., vol. 37:73-76, June 1972. 16 refs. Translated from Russian, 8p.

Studies of the role of nutrition in the development of pathological conditions in experimental animals are reviewed. In one study, the lethal dose of 50 pesticides was determined for three groups of rats: a group given a low protein diet (3.5% casein), a group given an optimum protein diet (26% casein), and a control group given at least 20% natural protein. The toxicity of pesticides, beginning with diazine, increased for animals on the casein diet in comparison with animals on the natural protein diet. The toxicity of pesticides, beginning with malathion and above, increased for animals on the control diet. The most toxic pesticide was chloropropane and the least toxic was captane. Tests were also conducted with a high protein diet (81% casein). The lethal dose 50 of pesticides for rats on this diet increased approximately four times compared with that for rats on the 26% casein diet. Another study investigated the effect of lack of protein on sex glands in male rats. A decrease in the life of spermatozooids was noted in animals who received 50 micron/kg sevine with a low protein diet (9%) as compared with animals who received the same amount of sevine with 18% or 22% protein. The administration of thalidomide had a teratogenic effect on embryogenesis in pregnant rats given reduced amounts of riboflavin and folic acid in a suboptimal diet. With adequate riboflavin and folic acid in the suboptimal diet, the teratogenic effect of thalidomide did not develop. These results indicate that nutritional background must be considered in studies of the toxicity of foreign chemical substances.

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APTIC NO. 49570

Sugibayashi, A., H. Owada, G. Ogata, and Y. Hayashi

HISTOPATHOLOGICAL STUDIES ON THE EFFECTS OF AIR POLLUTION ON THE RESPIRATORY

SYSTEM. (*Taiki-osen no kokyukikei ni oyobosu eikyo ni kansuru byorissoshikigakuteki kenkyu*). Text in Japanese. *Nihon Byori Gakkai Kaishi* (Trans. Japan. Pathol. Soc.), no. 61:197, 1972. (Presented at the Japan Pathology Society, Annual Meeting, 61st, Japan, April 4-6, 1972.)

Four dogs from highly polluted A district in Fuji city (sulfur dioxide concentrations over 0.06 ppm on the average), 26 dogs from moderately polluted B district in Fuji city (SO₂ concentrations of 0.05 ppm), and nine control dogs from non-polluted areas of Fujinomiya city were studied histopathologically. Three of the A district dogs had moderate to high proliferation of basal cells of the airway epithelium and inflammatory cells of the submucosa. Nine of the B district dogs showed moderate to high proliferation, and only five dogs of the nine showed cell infiltration. Slight proliferation occurred in 14 B district dogs, five of which had cell infiltration on the submucosa. Symptoms were worse in older dogs. Thus, there was a close relationship between air pollution, length of exposure to pollution, and proliferation of basal cells of the airway epithelium. The carbon dust deposition was generally low; it was conspicuous in dogs over 4 years old and obvious in those over 2 years old. Almost all cases were bronchiogenic.

27972

APTIC NO. 49268

Takemoto, Kazuo, Fumihiko Ichikawa

PATHOLOGICAL STUDIES OF THE LUNG DISEASES CAUSED BY AIR POLLUTION. (*Taiki-osen no kokyuki no oyobosu eikyo*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 203. (Nov. 7-9, Paper 158.)

As a basic study for the effects of air pollution on the human respiratory system, lungs of dogs were examined. In this report, the results of histopathological studies of approximately 1700 stray and wild dogs slaughtered from 1962 to 1972 were examined. The tonsils, nose, pharynx, larynx, bronchi, pulmonary hilum, and pulmonary lobes of the dogs were removed immediately after the death; they were observed, and histological specimen models were made. The multiple layer flat epithelium had no anomalies; reactions to foreign objects such as carbon particles were noted in the tonsils, especially of old dogs from highly polluted areas. In the pharynx, partial flat epithelium proliferation was noted. In the bronchial center, mucous secretion cells had increased. In the pulmonary hilum, chronic inflammation proliferation of epithelium was noted. There was a high ratio of visible diseased colonies caused by dusts in the air passage of old dogs from highly polluted areas. Various forms of lung anomalies were observed. The five malignant examples of tumors were all adenocarcinomas. An experiment on chicken and pigeon lungs exposed to carbon particle inhalation is briefly discussed.

27973

APTIC NO. 49365

Takenaka, Koji, Minoru Tsuda, Tomokazu Okumura, Hideo Yamaguchi, and Yoshizo Tsunetoshi

EPIDEMIOLOGICAL SURVEY ON THE EFFECTS OF GASEOUS FORMALDEHYDE ON THE HUMAN BODY. (*Horumarin gasu haishutsu koso shuhen no jumin kenko chosa*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 218. (Nov. 7-9, Paper 172.)

Some complaints were made on the effects of formaldehyde emitted by an organic chemical plant manufacturing urea resin products. The area of the plant is densely populated. Between Sept. and Nov. 1971, the health conditions of inhabitants around the plant were examined. A questionnaire was sent to 1435 families by mail, and 1012 were returned. Health examination was given to people who complained of eye irritation in the questionnaire, and 445 were given examinations of eyes, ears, nose, throat, respiratory functions, and other internal organs. The number of those who complained of eye irritation, throat irritation, and dryness was significantly high among the women who stayed home during the day, and the

number was proportionate to the proximity of their houses to the plant. The rate of complaints was high in the order of eye irritation, throat discomfort, and nose discomfort. The main diagnoses for the eye were conjunctivitis and inflammation of conjunctiva, for the nose, chronic rhinitis, and for the throat, chronic pharyngitis and laryngitis.

27974

APTIC NO. 49164

Takizawa, Yukio, Isamu Hagima, Yoshihiro Watanabe, Tatsuo Oshina, and Setsuo Kuroda

EPIDEMIOLOGICAL STUDIES OF FLUORIDES EFFECTS ON THE HUMAN BODY, 2ND REPORT. (*Fukukabutsu no jintai ni oyobosu eikyo no chigaku-teki kenkyu, Dai-2-ho*). Text in Japanese. *Kankyo Hoken Report*. (*Environ. Health Rept.*), no. 13:69-80, Sept. 1972. 1 ref.

A complete and detailed report is presented on the findings of the third examinations of the 15 patients who were screened by two previous health examinations of 1152 people living 1 km from a chemical factory in Niigata Prefecture. Examinations were given to find out their awareness of symptoms, general clinical diagnoses, dental conditions, basic metabolism, cardiogram, hematological conditions, enzyme functions, fluoride content in their urine, and the chest and bone x-ray results. The total discovery rate of all the examinees was 7.5%. Most people had some form of complaints such as coughing and gagging (69.2%), sputum (69.2%), rhinitis (61.5%), wheezing (53.8%); these symptoms worsened in southerly winds (42.2%). Other common symptoms were exhaustion, toothache, palpitation, and skin damage. All 15 patients originally had more than 1.2 ppm F content in their urine, but in this third test, only three had more than 1.2 ppm, and the average was 0.853 ppm. The chest X-ray showed that 10 persons had the shadows of lung fibrosis. Other X-ray findings were abnormality of the hip bone on six persons and a suspicion of the same on one person; irregularities on other parts such as the knees, pelvic bones, elbows, and hands were recognized on several patients. Altogether, 84.6% of the patients (11 persons) showed some form of abnormality in their bone formation. The general clinical test showed that 10 persons had high blood pressure, seven had chronic bronchitis, and two had bronchial asthma and skin disease.

27975

APTIC NO. 49499

Tanaka, A., E. Yokomura, Y. Shimizu, M. Ogata, K. Kumashiro, and S. Senoo

STUDY ON THE PERMEABILITY OF INHALED PARTICLES OF LEAD THROUGH THE ALVEOLAR WALL. (*Kyunyu sareta namari biryushi no haihoheki toka ni kansuru kenkyu*). Text in Japanese. *Nihon Byori Gakkai Kaishi* (Trans. Japan. Pathol. Soc.), no. 61:196-197, 1972. (Presented at the Japan Pathology Society, Annual Meeting, 61st, Japan, April 4-6, 1972.)

Rats were exposed to 147 mg/cu m/hr of lead nitrate for 5, 15, 30, 60, 180, and 300 min. Then the rats were killed and the lungs removed for electrographic examination. Lead from the exposure entered the blood after 5 min of inhalation; lead particulates were found in the lung after 1 hr. Lead entered erythrocytes after 3-5 hr of exposure. Lead entered the lymph and blood stream and thus affected the entire body.

27976

APTIC NO. 49271

Tsuji, Yoshito, Hiroko Kunita, Yasuo Homma, Iwao Watanabe, and Matsuura Kiyokatsu

THE CHANGES OF THYROID OF CHILDREN IN FLUORIDE-POLLUTED AREAS. (*Fukukabutsu ni yoru kankyo-osen to kojosen shucho*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 201. (Nov. 7-9, Paper 156.)

The pollution from an aluminum refining factory has been investigated for several years. In this report, air pollution by fluorides between Jan. and Dec. 1971 and thyroid gland

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swelling were examined. Fluoride content in the air was sampled with the rain water collected in deposit gauges. Children of two elementary schools were given health and dental examinations, and the frequency of the swelling of the thyroid and maculosa teeth were studied. There were some occurrences that could suggest the effects of fluoride pollution. But there were instances of swelling of the thyroid and maculosa teeth in unpolluted areas also, and the examples were too few to relate the instances with the fluoride pollution.

27977

APTIC NO. 49847

Tsulaya, V. R.

SANITARY-TOXICOLOGICAL APPRAISAL OF THE COMBINED EFFECT OF A MIXTURE OF BENZENE AND ACETOPHENONE VAPORS IN ATMOSPHERIC AIR. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Third Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants.* M. Y. Nuttinson (ed.), Vol. 15, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 57-68. 22 refs. Translated from Russian. (Also: *Vypust' II, Izdatel'stvo Meditsina, Moskva, p. 107-120, 1968.*)

NTIS: PB 211074

The nature of the biological effects of a mixture of low benzene and acetophenone concentrations on human health was studied in laboratory experiments on rats. The total concentration index of the threshold mixtures was equal to one. Chronic exposure of rats to a mixture in concentrations of 9.0 and 0.030 mg/cu m effected a series of statistically reliable functional shifts in the central nervous system, blood system, and in the total content of nucleic acids in the blood. Reversible pathomorphological changes were also determined in certain internal organs. Chronic exposure at the level of the maximum inactive concentrations had no effect. When benzene and acetophenone are present together in atmospheric air, therefore, the total concentration of the mixture in fractions of the maximum permissible concentration of each substance should not exceed 1.5.

27978

APTIC NO. 49807

Tsunoda, Fumio, Ekuko Aizawa, Shiro Sakurai, Hiroko Kunida, and Kazuo Sasaki

ON THE FLUORIDE BODY BURDEN OF RESIDENTS LIVING IN FLUORIDE POLLUTED AREAS. (*Taiki-chu fukkabutsu ni yoru kankyo osen chiku jumin no seitai osen ni tsuite*) Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 199. (Nov. 7-9, Paper 154.)*

The fluorine pollution of the living body checked by the urine test is discussed. When a solution of fluoride is taken orally, an increase of fluorine content in the plasma is noted in 15 min, and the index reaches a peak in 30 min, then drastically reduces. Approximately 15% of orally taken fluorine is excreted in the urine in 1 hour, 25% in 2 hours, 43% in 3 hours, and more than 50% of the consumed fluorine is excreted in 12 hours. When examining the in-vivo effects of fluorine by urine samples, spot sampling is not enough, but continuous tests are necessary. According to the 24-hour samplings of people living in a fluorine polluted area, in more than 1 l of urine averages of 2.05 plus or minus 0.30 mg/person of F for 13 men, and 1.77 plus or minus 0.43 mg of F for 17 women were excreted. A similar test was given to people in an unpolluted area, and averages of 0.79 plus or minus 0.07 mg/person for nine men and 0.73 plus or minus 0.07 mg for 13 women were excreted in 24 hr. The difference was connected to be the amount of fluorine residues in the agricultural produce gathered from the environment. The results of an examination of teeth fluorosis in a polluted area is briefly mentioned.

27979

APTIC NO. 49202

Umukai, Kotaro

EXPERIMENTAL STUDIES ON AIRWAY INFECTION (II). INFECTION DUE TO A VIRUS AFTER EXPOSURE TO LOW CONCENTRATIONS OF SO₂ FOR LONG PERIODS. (*Kido kansen ni kansuru jikken teki kenkyu (Sono 2). Chokikan tei-nodo SO₂ bakuro go no birusu kansen*). Text in Japanese. *Nihon Jibi Inkoka Gakkai Zasshi (Jap. J. Otolaryngol.), 77(12):143, Dec. 1972. (Presented at the Japan Society of Otolaryngology, Tokai Branch, 244th, Japan, 1972.)*

The mice under the long exposure to sulfur dioxide at low concentrations were infected with a virus, and the mode and progress of the infection in their nasal cavities were traced and compared to those only infected with the virus. After the long period of exposure to SO₂ at low concentrations in the air, the chalice cells of the nasal mucosa increased with glandular hypersecretion beneath the epithelium; however, the cilia were not so much recognized and the inflammatory change was slight. When the virus was infected at these states, the inflammation appeared earlier and progressed faster. Taking into consideration the fact that the virus proliferated after being taken into the nasal epithelial gland, and the inflammation expanded, it was assumed that the proliferation of secretory cells due to SO₂ exposure caused the earlier invasion of the virus into the living body, causing in turn the earlier appearance of the symptoms.

27980

APTIC NO. 49813

Ungar, Ralph Frank

THE EFFECT OF CARBON MONOXIDE EXPOSURE ON SUSCEPTIBILITY OF MICE TO RESPIRATORY INFECTION WITH LISTERIA MONOCYTOGENES. *Oklahoma Univ., Norman, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 76p. 40 refs.*

Male inbred BALB/cj mice were exposed to 100 ppm of carbon monoxide over 2, 3, 4, 5, or 6 days and subsequently infected with *Listeria monocytogenes* via the respiratory route. Mice so treated evidenced increased resistance to listeria infection as manifested by a lower death rate and an increased length of survival. No dose-effect relationship could be established. This finding suggests that low CO levels can exert a beneficial effect on defensive mechanisms of the host. Carbon monoxide did not alter the numbers or distribution or coliform bacteria in the colon of mice. In vitro phagocytic properties of pulmonary and peritoneal macrophages derived from mice exposed to CO demonstrated enhanced phagocytic properties. Likewise the macrophages exhibited a marked ability to suppress the intracellular proliferation of listeria. The suppression of listeria replication was further reflected in the spleen assay studies of the CO exposed, non-immunized, and immunized mice. Both experimental groups evidenced enhanced antibacterial activity. It would appear that CO served as a non-specific activator for macrophage phagocytic activity which in turn played a dominant role in affording the animals with a marked degree of protection against listeria infection. The action of CO, in all probability, is related to alterations associated with biochemical or immunological activities of the phagocytic cells in some as yet unexplained manner which endows the cells with a greater capacity to phagocytize and kill microorganisms.

27981

APTIC NO. 49289

Yamaga, Mineo, Kaoru Omori, Takashi Tozawa, and Kazunori Abe

STUDIES OF LEAD CONTENT IN CHILDREN'S TEETH. (*Gakudo no shigachu enryo no kento*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Air Pollut., 13th, 1972, p. 214. (Nov. 7-9, Paper 168.)*

The effects of lead in automotive exhaust gases were examined using the lead deposits in schoolchildren's teeth as one indication. One hundred and seventy-seven teeth were collected (fallen or extracted baby teeth and decayed teeth) from polluted areas of Kawasaki and Yokohama, medium polluted areas in suburban Kawasaki and Fujisawa, and one control area at the foot of the Tanzawa mountains. The lead content was measured by the dithizone method. There was no difference between boys and girls. Significantly higher lead deposits were recognized in polluted and moderately polluted areas compared to nonpolluted areas. As for the age differences, lower figures were noted among older children in the nonpolluted area and in one polluted area; but there was no difference by ages in other areas. The difference according to the duration of residence in one area was noted among the older children in one polluted area and in one medium polluted area. Further examinations are necessary, but in general, the effect of lead pollution was noted in the teeth of the children in highly and moderately polluted areas.

27982

APTIC NO. 49869

Yelakhovskaya, N. P.

ON THE METABOLISM OF NICKEL ENTERING THE ORGANISM WITH DRINKING WATER. (*K izucheniyu obmena nikelya, postupayuschevo v organizm s pit'evoy vodoy*). *Gigiena i Sanit.*, 37(6):20-22, 1972. 6 refs. Translated from Russian, 7p.

For 6 months white male rats were given daily peroral administrations of 0.005, 0.5, or 5 mg/kg nickel chloride, which corresponded to nickel concentrations in drinking water of 0.01, 10, and 100 mg/l, respectively. Throughout the experiment the animals received briquetted feed with an average nickel content of 2 mg/kg. Nickel in water, food, and biological materials was determined by the Chilton method. Calculations of the ratio of nickel taken in with food and water showed that at a 0.005 mg/kg dose, the amount of nickel entering the body with water, was many times less than that entering with food; at 0.5 and 5 mg/kg doses, nickel intake was 4.5 and 45 times greater with water than with food. Of the nickel taken in with drinking water, about 95% was excreted through the gastrointestinal tract and only about 5% through the kidneys. An increase in the amount of nickel in kidneys was observed following administration of all doses studied. With a 5 mg/kg dose, there was an increase in the nickel content of liver, adrenal gland, and spleen. Changes in the functional state of the gastrointestinal tract (e.g., in alkaline phosphatase and enterokinase activity) occurred following administration of 0.5 mg/kg nickel.

27983

APTIC NO. 49312

Yokoyama, Eiji

COMPARISONS OF THE PENETRATION RATE OF INHALED O₃, NO₂, AND SO₂ INTO THE RESPIRATION PASSAGES. (*Kyonyu O₃, NO₂, oyobi SO₂ no jokido ni yoru setshu ritu no hikaku*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 192. (Nov. 7-9, Paper 147.)

The lower parts of the upper air passages (nose and mouth) of anesthetized dogs and rabbits were surgically separated, and various concentration gases were passed through them. The inhalation and exhalation concentrations were measured to see the deposit rate of the gas in the respiratory system. The deposit rate through the nose was higher than that through the mouth. The deposit through the nose and mouth were inversely proportionate to the amount of the gas flow, and setting the passages aside, inversely proportionate to the concentration. In the 10-15 min exposure, the nitrogen dioxide deposit rate was 42%. The sulfur dioxide deposit rate was 94%. Under a 30 min exposure, 20 ppm SO₂ deposit rate was more than 95%, and more than 99% was taken in through the nose. When using 1, 10, and 50 ppm SO₂, under the same flow rates, the through-nose deposit rates of SO₂ was higher than those of

ozone or NO₂. The ozone deposit was extremely low, especially through the mouth, and under a high flow rate.

27984

APTIC NO. 49369

Yoshida, Ryo, Takeshi Motomiya, Motoaki Date, Masao Matsumura, and Kozo Ito

RESPIRATORY FUNCTION TEST OF PRIMARY SCHOOLCHILDREN IN FUJI CITY. (*Fuji-shi no gaku-do no kokyu kino kensa*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 216. (Nov. 7-9, Paper 170.)

A total of 180 elementary schoolchildren have been examined periodically, twice annually, since Oct. 1970. These children were all born and lived in the areas of their schools, and they were in the fifth grade when the first examination was given. Twelve examinations have been given altogether, and vital capacities were compared each time. The averages were compared with those of the children of Tateyama Primary School in Chiba Prefecture. The monthly sulfur oxides averages ranged from 0.027 to 0.055 ppm in the four school areas of Fuji. No significant difference was noted among the four schools at each examination. However, in Oct. 1971 and Nov. 1970, the average at one school dropped more than 0.1 liter. The regression coefficient of the projected vital capacity and actual vital capacity of each examination were compared, and the increase in the average vital capacity and the average height growth were compared. The height growth showed a regular increase. The increase of lung capacity showed an interruption among the girls of one particular school. Others showed a smooth growth in general. There was no clear indication that the vital capacity was affected by the amount of sulfur oxide pollution, or that the ratio of the growth of vital capacity to the height was affected by pollution. However, the ratio of growth in vital capacity was poor against the ratio of growth in height. This seems to show that even limited degrees of pollution can affect human health.

27985

APTIC NO. 49870

Zarubina N. A.

THE ROLE OF ENVIRONMENTAL FACTORS IN THE DEVELOPMENT OF CHRONIC PNEUMONIA. (*Rol faktorov vnzhney sredy v vozniknovenii khronicheskoy pnevmonii*). *Gigiena i Sanit.*, 37(6):99-101, 1972. 8 refs. Translated from Russian, 5p.

Eighty patients (43 men and 37 women) suffering from chronic pneumonia for 2-7 years were examined to determine the role of bacteria in the development and aggravation of the disease. Analysis of patient phlegm showed the presence of 540 strains of microbes. In 92.5% of the cases, associations between microbes were observed; the most frequent association was staphylococcus plus streptococcus (67 times). Staphylococci accounted for 30% of the microflora, streptococci for 17.4%, pneumococci for 9.5%, and *Escherichia coli* for 7.4%. Pathogenesis of isolated staphylococci cultures was determined by the following tests: ability to coagulate rabbit blood, presence of lecithinase and hemolytic activity, pigmentogenesis, and mannitol fermentation reaction. The most common staphylococci were the white hemolytic plasma-coagulating type (57 strains), and the least common were the golden hemolytic nonplasma coagulating type (13 strains). There was an almost equal number of white hemolytic nonplasma-coagulating and golden hemolytic plasma-coagulating staphylococci (47 and 45 strains), respectively. The most frequently distinguished streptococci were the green (71 strains) and the non-hemolytic (62 strains). The results demonstrate the importance of sanitary-bacteriological pollution of the environment in the development of chronic pneumonia.

27986

APTIC NO. 49844

Zibireva, I. A.

SOME ASPECTS OF THE BIOLOGICAL EFFECT OF MICROCONCENTRATIONS OF TWO CHLOROISO-

CYANATES. In: *American Institute of Crop Ecology Survey of USSR Air Pollution Literature. A Third Compilation of Technical Reports on the Biological Effects and the Public Health Aspects of Atmospheric Pollutants.* M. Y. Nuttonson (ed.), Vol. 15, Silver Spring, Md., American Institute of Crop Ecology, 1972, p. 6-18. 17 refs. Translated from Russian. (Also: Vypusk II, Izdatel'stvo Meditsina, Moskva, p. 91-107, 1968.)

NTIS: PB 211074

The degree and character of the effect of microconcentrations of para and meta-chlorophenyl isocyanates on the human body were studied. The low level of the active concentrations indicated a high toxicity, with para-chlorophenyl isocyanate as the more toxic substance. The toxic effect was chiefly manifested in a straining of the defensive reactions of the body. During the action of 0.03 mg/cu m of para-chlorophenyl isocyanate, certain signs of allergization of the animals were determined. Differences in chemical structure were significant influences on the degree and character of the toxic effects. The highest single and mean daily maximum permissible concentrations for the isocyanates are proposed at levels of 0.0015 and 0.005 mg/cu m, respectively.

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APTIC NO. 49424

Kanagawa Prefecture (Japan), Working Group of Countermeasure for Photochemical Pollution

A REPORT ON THE INVESTIGATION AND RESEARCH. (Chosa Kenkyu kekka no hokoku). Text in Japanese. In: *Progress Report on an Investigation of the Effects of Photochemical Smog on the Human Body.* (Kokagaku kogai ni yoru jintai eikyo no jittai chosa kekka ni tsuite), p. 34-51, 1971.

Epidemiological studies were conducted in various areas of Kanagawa Prefecture as to the effects of photochemical smog on schoolchildren. A report on the 13 students of the Isoko Industrial School who were affected on August 21, 1971 showed that 15% of them experienced spasms, and 23% numbness of the limbs. Two children were hospitalized from cerebral anemia, but were discharged in two days. Pollution by 0.001-0.05 ppm of acrolein was confirmed by gas chromatography in the area. Another investigation by a questionnaire of 7295 children of schools in Kawasaki and Yokohama showed that 94.8% of boys and 95.5% of girls have some experience with the symptoms caused by photochemical pollution. Eye irritation, respiratory suffocation, and chest pains or palpitation were major symptoms; 64% of symptoms occurred between 1 and 2 pm; the duration of symptom was approximately 2 hr, but in some areas, much longer. There were geographical differences for respiratory and heart symptoms. A high correlation was noted between oxidant concentration and the symptom appearances, and a partial correlation was recognized between the frequency of symptoms and the concentration of nitrogen dioxide. Sulfur dioxide, hydrocarbons, nitric oxide, and dust concentrations were also noted.

27988

APTIC NO. 49448

Bittel, Robert and Bernadette Vaubert

PROBLEMS INVOLVED IN THE PREVENTION OF FLUORINE AND FLUORINE COMPOUNDS-GENERATED HAZARDS. (Analyse des problemes de protection poses par le fluor et les composés fluorés). Text in French. Centre d'Etudes Nucleaires, Fontenay-aux-Roses (France), Dept. de Protection, 54p., June 1971. 81 refs.

NTIS: CEABIB200

General problems of the hazards involved in and the effects on man, animals, and plants of fluorine and its compounds, as well as the possible sources of fluorine emissions with special regard to fission fuel processing and nuclear engineering are

reviewed. Fluorine and its compounds, either ingested or inhaled, are carried by the blood to different organs such as the kidney, and are eliminated relatively rapidly in urine. Gastrointestinal, cardiac, and renal damages, pulmonary edema, convulsions, and irritation of the respiratory tract are typical symptoms of acute fluorine poisoning. Fluorosis due to chronic exposure to fluorine and its compounds manifests itself in bone and tooth damage, gastrointestinal troubles, and asthma. Unlike cattle, humans are relatively insensitive to fluorine intake. Colchicum autumnale, Lilium sp. cultivar, Iris germanica and Vitis vinifera L. are among the most fluorine-sensitive plant species. Physical and chemical properties, as well as metabolic mechanisms of various fluorine compounds are described.

27989

APTIC NO. 49702

Cohen, Arlan A., Carl M. Shy, Ferris B. Benson, Wilson B. Riggan, Vaun A. Newill, and John F. Finklea

AIR POLLUTION EPISODES. A GUIDE FOR HEALTH DEPARTMENTS AND PHYSICIANS. HSMHA (Health Serv. Ment. Health Adm.) Health Rep., 86(6):537-550, June 1971. 25 refs.

Duties of health departments and physicians during air pollution episodes are described. Experiences from recorded air pollution episodes show excess mortality and cardiorespiratory morbidity during air pollution episodes, and that health effects of air pollution begin as soon as the smog occurs. Certain groups, especially patients with asthma, bronchitis, emphysema, coronary artery, and other cardiac disease, as well as premature infants postoperative patients, patients with cancer, patients with congenital heart disease, and persons with anemia, are far more susceptible than others to the effects of air pollution episodes. Defining a crisis and knowing when one is imminent or occurring, maintaining effective lines of communication with hospitals, local practitioners, and the public, coordinating studies of health effects during and after the episode, and helping local governments to devise and implement a plan for abatement are the basic tasks of health departments. The criterion of critical concentration value should be a combination of weather and pollution conditions, and the pollution trigger value should be set well below the level of pollution known to cause an increase in mortality and as low as practically possible. The number of visits to physicians, and especially reports of panels of susceptibles, mainly patients with asthma and bronchitis, are among the most sensitive indicators of air pollution episodes. Physicians should be aware of the occurrence of air pollution alerts.

27990

APTIC NO. 49712

Hardy, Harriet L., Richard I. Chamberlin, Clarence C. Maloof, George W. Boylen, and Mary C. Howell

LEAD AS AN ENVIRONMENTAL POISON. Clin. Pharmacol. Therap., 12(6):982-1002, Nov.-Dec. 1971. 86 refs.

Toxicological, therapeutic, and environmental studies on lead as an environmental poison are reviewed. Lead, being a cellular poison, interferes with cellular enzymatic processes, and may cause severe, sometimes irreversible, damage especially to developing tissues in the fetal and infantile organism. Excess lead is deposited in storage tissues, especially bone, and can be mobilized and recirculated in circumstances of physiologic stress. Thirty to forty percent of all inhaled lead is absorbed, of which 4 to 8% may be retained. The effects of lead in the bone marrow and blood are seen in decreased hemoglobin, stripping of red cells, and increased urinary coproporphyrin and delta-aminolevulinic acid. Depending on the conditions of intake, lead may produce acute manifest illness, symptomatic chronic illness, and asymptomatic chronic poisoning. Air sample investigations performed in Cambridge in 1970, showed that lead concentrations from automobile exhaust followed the same pattern as the lead in soil, i.e., highest at the roadside with lesser amounts farther from the roadway. Correlation between lead in air concentrations and traffic

density was demonstrated. A study of the seasonal variations of traffic-generated lead in air concentrations showed increased lead levels in summer, most probably due to intensified traffic in that season. Clinical, diagnostic and therapeutic considerations on paint lead poisoning in children are presented.

27991

APTIC NO. 49711

Hasegawa, Norihiko, Atsuko Hirai, Toshihiko Shibata, Haruko Sugino, and Tsutomu Kashiwagi

DETERMINATION OF LEAD IN HAIR BY ATOMIC ABSORPTION SPECTROSCOPY FOR SIMPLE SCREENING OF LEAD INTOXICATION. *Annu. Rep. Res. Inst. Environ. Med. (Japan)*, vol. 18:1-5, 1971. 3 refs.

Analysis of lead in hair segments by atomic absorption spectrometry is described and compared with corresponding results of blood and urine lead investigations. About 100 mg of hair cut close to the scalp was washed with aqueous solution of ethylenediaminetetraacetic acid, and boiled in ion-free water, acetone, and ether. Specimens of hair were cut at least in two, but preferably several segments weighing at least 20 mg. Each segment of hair was digested separately with a mixture of nitric and perchloric acids at room temperature overnight, and then reduced to a few drops of clear fluid. Absorption spectra were evaluated against a calibration curve constructed for known concentrations of lead in the 0.1 to 1 microgram/ml range. A comparison of hair lead concentration measurements with blood and urine sample analyses revealed good correlation between clinical and laboratory findings and lead content in hair. Hair lead analyses were even more sensitive than other laboratory methods, and revealed the presence of lead even when no clinical symptoms of lead poisoning were present. Since the growth rate of scalp hair is fairly constant and continuous, the time of exposure to lead can be determined by comparison of lead contents in different segments of a hair. The above quantitative analytical procedure may provide a simple screening method in health control of lead workers.

27992

APTIC NO. 49642

Kamada, T.

HYGIENIC STUDIES OF PESTICIDE RESIDUES. REPORT NO. 1. ACCUMULATION OF THE BHC ISOMERS (ALPHA, BETA, GAMMA, AND DELTA) IN THE BODY OF THE RAT AND URINARY EXCRETION FOLLOWING ORAL ADMINISTRATION. (*Zan-ryu Notaku no Eiseigakuteki Kenkyu. Dai 1 Ho. BHC (Alpha, beta, gamma, oyobi delta) Iseitai Keiko Toyo Ratto no Tainai Chikuseki oyobi Nyochu Haisetsu*). *Nippon Eiseigaku Zasshi (Japan. J. Hyg.)*, 26(4):358-364, 1971. 14 refs. Translated from Japanese, 19p.

Four pure isomers of benzene hexachloride (BHC) (alpha, beta, gamma, and delta) were administered orally to rats and an investigation was made of the accumulation within the body and urinary excretion by making quantitative determinations of the four BHC isomers in the blood, liver, kidneys, and urine by gas chromatography. Comparative studies were also made of decomposition and isomerization within the living body. The experimental methodology is described and discussed in detail. Quantitative results of the investigations are listed. Tests indicated that the persistence of the four BHC isomers within the body are in the order of: beta greater than alpha greater than gamma greater than delta. These differences in persistence were attributed to the differences in the chemical stability of the BHC isomers within the body. The BHC which was not changed within the body was excreted in urine in the same order as their persistence within the body. When alpha-, gamma-, or delta-BHC was administered instead of the beta form, the beta-BHC accumulated within the body because the isomers were isomerized into the beta-BHC form within the body.

27993

APTIC NO. 49707

King, Barry G.

MAXIMUM DAILY INTAKE OF LEAD WITHOUT EXCESSIVE BODY LEAD-BURDEN IN CHILDREN. *Amer. J. Dis. Child.*, 122(48):337-340, Oct. 1971. 8 refs.

A maximum daily permissible lead intake of 300 micrograms from all sources was determined for children, with special regard to those in the age bracket of 1-3 years old. Since the average intake increases above this value, the entire amount cannot be excreted and accumulation in the body begins, and this accumulation will increase progressively as long as undue ingestion continues. The daily permissible intake has been established on the basis of levels of lead in the blood of nonexposed and exposed children including those with lead poisoning; results of experimental lead ingestion by adults; fecal lead output in children; initial biologic effects of increased lead intake, rates of increase in lead in the blood of exposed children, and sequelae of lead poisoning. The mean lead concentration in the air varies between 1 to 3 micrograms/cu m, while that in the diet accounts for 100-140 micrograms/day. The daily intake may range from about 146 micrograms to 206 micrograms. Ninety percent of the ingested lead and 50% of the retained inspired lead are excreted, corresponding to a fecal output of 98-143 micrograms/day. Arithmetic increases in blood-lead concentration above 40 micrograms/100 mg whole blood are correlated statistically with exponential increase in the daily urinary output of delta-aminolevulinic acid and with exponential increases in the chelatable lead. The increase in urinary excretion of delta-aminolevulinic acid provides evidence of an adverse metabolic affect; namely, interference in porphyrin metabolism and in the formation of heme.

27994

APTIC NO. 49129

Koizumi, Seitaro, Sukeji Suzuki, Hideo Yamanobe, Takashi Amemiya, Eiko Ohsawa, and Tetsuya Totani

HYGIENIC CHEMICAL STUDIES ON HARMFUL ELEMENTS (IV). CADMIUM, LEAD, ARSENIC, ZINC, COPPER AND IRON CONTENT OF HUMAN HAIR IN TOKYO. (*Yugaisei genso ni kansuru eisei kagakuteki kenkyu (daiyonpo)*, Tokyo tomin no mohatsuchu no kadamumu, namari, hiso, aen, do oyobi tetsu no ganyuryo ni tsuite). Text in Japanese. Tokyo-Toritsu Eisei Kenkyusho Nenpo (*Annu. Rept. Tokyo-to Lab. Med. Sci.*), no. 23:101-109, 1971. 19 refs.

The concentrations of cadmium, lead, arsenic, zinc, copper, and iron in human hair collected in the Tokyo metropolitan area were determined. The obtained data were evaluated statistically with regard to sex and age; the operating conditions of the experiment and frequency distributions of the trace elements in hair are presented. The distribution histograms of trace elements in the hair were similar to the logarithmic-normal type. The concentrations of trace elements in the hair of females were higher than those in the males. The concentrations of zinc, copper, and iron were directly related to age - increase in concentration was found with advancing age in both sexes (the concentration of copper in the hair of males decreased up to 40 years old and increased thereafter), while in females a contrary pattern arose. The correlations among trace elements were not high, but a certain degree of correlation was found between lead and copper in both sexes.

27995

APTIC NO. 49203

Lawther, P. J.

AIR POLLUTION AND ITS EFFECT ON MAN. *Proc. Roy. Inst. Great Britain*, 44(203):74-94, April 1971.

Several important parameters of air pollution and its effects on human health are reviewed. The degree of air pollution is often reported in terms of concentrations of smoke and sulfur dioxide; these, however, are only indices of air pollution. The effects of these, depending on particle size and particular com-

position, are considered. The major effects include respiratory tract irritation, respiratory and cardiac diseases, damage to sensitive tissues, chronic mechanical stress, and increased mortality and morbidity. Various measurement and research methods are reviewed, and data on mortality and morbidity in London, deviations from the average, correlations of illness with pollution degree, lung cancer deaths, and pollution indices are tabulated.

27996 **APITC NO. 49128**

Nishima, Taichiro, Shingo Ikeda, Takahiro Tada, Hiroshi Yagyu, Mamoru Nagasaki, Ryoji Udo, and Hiroshi Kamijo.

MERCURY, LEAD AND CADMIUM CONTENTS IN HAIR OF RESIDENTS IN TOKYO METROPOLITAN AREA. (*Tokyo tomin no mohatsuchu suigin, namari oyobi kadomiumuryo ni tsuite*). Text in Japanese. Tokyo-Toritsu Eisei Kenkyusho Nenpo (Annu. Rept. Tokyo-to Lab. Med. Sci.), no. 23:277-282, 1971. 21 refs.

Concentration levels of mercury, cadmium, and lead in the hair of 293 residents in the Tokyo metropolitan area were determined. After the data were normalized by logarithmic transformation, median values (with 95% and 99% upper confidence limits) were obtained for the following concentrations: mercury -- 3.9 ppm, 11.2 ppm, 17.5 ppm; lead -- 16.5 ppm, 55.0 ppm, 90.6 ppm; and cadmium -- 0.7 ppm, 2.4 ppm, and 3.8 ppm, respectively. Fish eaters had elevated levels of mercury in the hair. This observation supported the view that an increased intake of tuna was responsible for the elevation of mercury content in the hair.

27997 **APITC NO. 49604**

Oka, Michio, Shigeo Yamaoka, Osamu Fukase, and Masanori Fukuda.

DYNAMIC BEHAVIOR OF PROTEOLYTIC ENZYMES OF THE LUNG EXPOSED TO OZONE. (*Ozone-bakuro ni yoru hai-tanpaku bunkai soso no dotai ni tsuite*). Text in Japanese. Osaka Shiritsu Eisei Kenkyusho Hokoku (Rept. Osaka City Inst. Hygiene), no. 34:133-134, 1971.

The reaction of the human respiratory system to air pollutants seems to have some relationship with local proteolysis. Experiments were conducted to examine the mechanism of the lung proteinase activity as a reaction to ozone. Six-week old rats were exposed to O₃ in a chamber. Proteinase activity was measured by extracting enzyme from freshly dissected lungs in physiological saline water. Six of 10 rats died after an exposure to 5-7 ppm O₃ for 3-4 hr. They had all developed acute emphysema and lung hemorrhage, and the weight of the lungs had increased almost three times over. The rats exposed to 2-3 ppm O₃ for 4 hrs developed lighter cases of emphysema and hemorrhage, but there was no death; the weight, water content, and protein quantity increased, but there was no change in the proteinase activity. A group of rats were exposed to 4-7 ppm O₃ for 1 hr and then returned to clean air with less than 0.01 ppm O₃ content. They lost weight 1 day after the exposure was given, but the rest of the time, the growth rate was same as the control group. The proteinase I activity did not change immediately after exposure, but in 5 days, it rose to 1.5 times over the control group. There was no change in the activity of proteinase II.

27998 **APITC NO. 49465**

Riggin, Wilson B., Douglas I. Hammer, John F. Finklea, Victor Hasselblad, Charles R. Sharp, Robert M. Burton, and Carl M. Shy.

CHESS -- A COMMUNITY HEALTH AND ENVIRONMENTAL SURVEILLANCE SYSTEM. Preprint, 22p., 1971. 36 refs. (Presented at the Berkeley Symposium on Mathematical Statistics and Probability, 6th, Berkeley, Calif., July 19, 1971.)

The goals, survey and research methodology, and organization of the Community Health and Environmental Surveillance

System (CHESS) developed by the Environmental Protection Agency to relate community health to environmental quality are reviewed. The CHESS program was constructed to evaluate existing environmental standards, quantitate pollutant burdens in exposed populations, and quantitate health benefits of pollutant control. The pollutant gradients include particulates, sulfur dioxide, photochemical oxidants, nitrogen oxides, and trace elements; pollutants for daily or monthly monitoring also include sulfates, nitrates, benz(a)pyrene, trace metals, dust fall, and nitrogen dioxide. CHESS health indicators include reversible pulmonary function changes, acute irritation symptoms, frequency and severity of asthma attacks, aggravation of chronic respiratory disease symptoms, and daily mortality rates as signs of acute exposure; and pollutant burdens, impairment of lung function, prevalence of chronic respiratory disease, frequency of lower respiratory disease, incidence of acute respiratory disease, and mortality studies for chronic exposure. Some recent findings are presented.

27999 **APITC NO. 49737**

Roberts, Polly.

REPORT FROM BEHIND THE LEAD CURTAIN. *Congressional Record*, vol. 117:S11706-S11711, July 21, 1971. (Submitted by Metcalf in Behind the Lead Curtain.)

The antiknock and automobile industries as well as researchers sponsored by them are charged with misleading the public regarding the health hazards of air pollution in general and of antiknock use, in particular. The petroleum industry, now having commercialized no-lead and low-lead gasoline at an increased price, increased the lead content of 4 g/gallon in premium gasoline, thus generating even more lead discharge into the environment. Recent research, not biased by industrial interests, revealed a steady rise in the lead level in the air, at a rate of about 7% annually, and an increase of lead in human bones. A high percentage of the inhaled lead is absorbed by the lung. City dwellers get between 1/3 and 1/2 of their total lead intake from the air. Due to its accumulation in the organism, lead absorbed in a single large dose and many small doses produces similar results. Symptoms begin with anemia, fatigue, loss of appetite, cramps, and headache. Low-level poisoning causes sterility, miscarriage, the birth of brain-damaged babies, while more severe poisoning may cause vomiting, kidney and nerve damage, and lead encephalopathy. More subtle effects of lead poisoning, such as shortened life spans and increased susceptibility to brain and kidney diseases, plague industrial workers. Delta-aminolevulinic acid is released at body lead levels far below those generally associated with lead poisoning symptoms. Lead also interferes with the action of an enzyme that normally converts delta-aminolevulinic acid into a related compound necessary for the synthesis of blood. The use of lead in gasoline can ruin catalytic afterburner use. Legislation and standards for air and fuel are mentioned.

28000 **APITC NO. 49706**

Rochm, Jeffery N., John G. Hadley, and Daniel B. Menzel.

ANTIOXIDANTS VS LUNG DISEASE. *Arch. Internal Med.*, 128:88-93, July 1971. 17 refs. (Presented at the Hartford Biology Symposium on Pollution and Lung Chemistry, 10th, Richland, Wash., June 5, 1970.)

The effect of antioxidants on the nitrogen dioxide and ozone oxidation of fatty acid methyl esters exposed as thin films, and the action of NO₂ and O₃ on male rats of the Sprague-Dawley strain were studied. Oxidation of purified fatty acid methyl esters was markedly increased by 1.5 ppm of NO₂ or O₃. Nitrogen dioxide oxidation occurred through conventional peroxidation mechanisms. Ozone reacted in thin films by directly attacking the double bond. Phenolic antioxidants (butylated hydroxyanisole, butylated hydroxytoluene, and vitamin E in a concentration of 0.01 micromol/mg of ester) retarded NO₂ but not O₃ oxidation. In aqueous media, O₃ oxidation occurred by direct attack and peroxidation; NO₂ oxidation by

conventional peroxidation. Both were retarded by phenolic antioxidants. Exposure of rats to 10 ppm NO₂ for 4 weeks resulted in reduction of polyunsaturated fatty acids in the vitamin E-depleted group. Exposure to 1.0 ppm ozone resulted in death from pulmonary edema of all animals within 22 days. Lethal time for 50% of the population was 8.2 days for vitamin E-depleted animals, and 18.5 days for those receiving vitamin E. Vitamin E appears to protect against the biological effects of photochemical air pollutants. Ozone seems to be much more toxic and less sensitive to protection by antioxidants than NO₂.

28001

APTIC NO. 49705

Sanders, Charles L., Thelma A. Jackson, Roy R. Adey, Gerald J. Powers, and Alfred P. Wehner

DISTRIBUTION OF INHALED METAL OXIDE PARTICLES IN PULMONARY ALVEOLI. *Arch. Internal Med.*, 127:1085-1089, June 1971. 17 refs. (Presented at the Hanford Biology Symposium on Pollution and Lung Biochemistry, 10th, Richland, Wash., June 3, 1970.)

The distribution of inhaled nickel monoxide and chromic oxide dust in pulmonary alveoli of female Syrian golden hamsters exposed to NiO and Cr₂O₃ aerosols over 85 days for 4 hours daily was studied. The phagocytic response of alveolar cells was a significant factor in determining the pulmonary distribution and fate of inhaled, insoluble particles. The type I alveolar epithelium and alveolar macrophages readily phagocytized inhaled NiO and Cr₂O₃ particles with 80% and 91%, respectively, of alveolar deposits being found in macrophages, and 0.5% and 4.2%, respectively, being localized in type I alveolar epithelium. Type II alveolar epithelium did not exhibit any phagocytic activity. Fewer NiO particles were found in macrophages, and more were found free in alveolar lumens following exposure to cigarette smoke, indicating an inhibition of phagocytosis of inhaled particles by cigarette smoke. The count median diameter for NiO in sections was about 0.15 micron and about 0.17 micron for Cr₂O₃. Particles of either metal oxide, greater than 0.4 micron, were not observed in any section.

28002

APTIC NO. 49720

Sanotskiy, I V and M Ya. Savina

CONDITION OF OFFSPRING OF RATS EXPOSED TO MERCURY IN COMBINATION WITH IONIZING RADIATION AND ALSO METALS IN COMBINATION WITH RADIOTHORIUM. In: *Otdalennyye Posledstviya Luchezykh Porazheniy*, Moscow, Atomizdat Publishing House, April 27, 1971, p. 483-489. 5 refs. Translated from Russian in: *Remote Aftereffects of Radiation Damage*, p. 532-538, Dec. 1972. Joint Publications Research Service, Washington, D. C.

NTIS: AEC-tr-7387

The condition of first and second generation offspring of rats exposed to mercury in combination with ionizing radiation and to stable isotopes of thorium, iron, and lead is discussed. Conditioned reflexes were produced in the offspring of both generations by a group accelerated method using the motor-food method. In another experiment the offspring in the first generation were administered radiothorium doses in a mixture with thorium, iron, and lead. Animals in the first litter were also subjected to the intramuscular administration of a tetanus toxin. The degree of reactions were evaluated and the general conditions of the offspring are listed. There is a complex dependence of the effect of the dose under the influence of metals; when the ancestors were exposed at the maximum permissible concentration level, mercury caused changes in the offspring.

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28003

APTIC NO. 49651

Schmaehl, D.

REPORT ON CANCEROGENIC SUBSTANCES IN POLLUTED AIR. Preprint, Deutschen Krebsforschungszentrum, Heidelberg (West Germany), Inst. fuer Experimental Toxicologie und Chemotherapie, 1971. Translated from German, 72p.

The degree of noxious impact of air pollution on human health was investigated. Tests were done to study the effects of motor vehicle exhaust gas on laboratory animals. Three test methods used include: tests outside the respiratory tracts, by intratracheal injection, and by inhalation. Analyses of exhaust gas condensate led to the isolation of twelve polycyclic hydrocarbons, two of which were found to be cancerogenic (benzo(a)pyrene and dibenz(a,h)anthracene). All tests are described, and limitations and future tests are discussed.

28004

APTIC NO. 49963

Schuetz, Alfred

THRESHOLD LIMIT VALUE FOR QUARTZ-CONTAINING FINE DUST UNDER THE SPECIFIC CONDITIONS PREVAILING IN THE SURFACE INDUSTRIES. (Der MAK-Wert fuer Quarzfeinstaub unter dem Gesichtspunkt der Verhaeltnisse in der oberbaugigen Industrie). Text in German. *Staub, Reinhaltung Luft*, 31(11):443-448, Nov. 1971. 25 refs.

Maximum allowable concentrations of fine quartz dust, including cristobalite and tridymite (0.15 mg/cu m), and of fine dust containing less than 4% quartz by weight (4 mg/cu m) were derived from considerations on the specific conditions prevailing in surface industries, from data on relationships between silicosis hazards and fine dust concentrations in various industries, and from dust balance calculations. Here, fine dust is defined as a dust not retained by a dust separator which has 50% efficiency for 5-micron-particles. The quartz content in dusts in the ceramic and the iron and steel industries are in the respective ranges of 5-20% and 5-10%. The silicosis hazards are highest in grinding and sand-blasting shops. A sharp decline in the silicosis frequency is due to a reduction of the workplace respirable quartz concentration to about 0.1 mg/cu m. Postmortem investigations of the dust load in the lung, as well as alveolar retention measurements are useful in dust balance calculations for the determination of threshold limit values.

1970

28005

APTIC NO. 49658

Charpin, J., C. Boutin, P. Autran, and R. Poirier

BERYLLIOSIS - A CASE HISTORY. (*La beryllose - a propos d'une observation*). *Marseille Med.*, 107(3):225-230, 1970. 13 refs. Translated from French. Translation Consultants, Ltd., Arlington, Va., 13p.

A case history of berylliosis is presented. The patient, a 33 year old male, had previously worked for 20 days in a plant whose atmosphere was heavily laden with beryllia dust (beryllium oxide). Original symptoms included acute pulmonary and ocular disturbance accompanied by dyspnea, fits of coughing, and ocular catarrh. The diagnosis was made as pulmonary berylliosis, and the patient was placed under corticotherapy. Tests were conducted and the results of radiography, tomographs, electrocardiograms, respiratory functional testing, carbon monoxide transfer, and immunological balance are given. Beryllium, the causative agent, and its characteristics are described, and acute and chronic poisoning is discussed on the basis of the case history. The prognosis for both acute and chronic poisoning is considered. Three diagnostic methods are reviewed, including a series of questions, radiography, and functional respiratory tests using gasometry. Preventive and curative treatments for berylliosis are presented.

28006

APTIC NO. 49782

Cooper, Charles F. and William C. Jolly

ECOLOGICAL EFFECTS OF SILVER IODIDE AND OTHER WEATHER MODIFICATION AGENTS: A REVIEW. *Water Resour. Res.*, 6(1):88-98, Feb. 1970. 49 refs.

Data and studies on the ecological effects of silver iodide and other weather modification agents are reviewed. The silver ion is among the most toxic of heavy metal ions, particularly to microorganisms and to fish. For silver to be toxic in low doses, the ionic form of the metal must come into direct contact with metabolically active sites, such as the cell membranes of microorganisms or the gas exchange surfaces of fish gills. The ease with which Ag forms insoluble compounds reduces its importance as an environmental contaminant. Silver is not likely to concentrate to harmful levels either through terrestrial or aquatic food chains. Iodine present in silver iodide is not harmful, and constitutes an essential trace element instead. Silver concentrations in rainfall from both seeded and unseeded storms are generally near the present limit of detectability. Pending additional laboratory investigations on the ecological effects of silver used in weather modification agents, silver from cloud seeding is assumed to be capable of retarding the growth of algae, fungi, bacteria, and fish in fresh water. Inhibition of aquatic microorganisms would interfere with the cycle that returns essential nutrients to the water. Silver in air and water should be regularly monitored. Organic seeding agents currently being proposed are not likely to be toxic in either the short or the long run, but dispersal of proprietary organic compounds should be prohibited unless their composition is fully revealed.

28007

APTIC NO. 49674

Grasso, R.

DERMATOLOGICAL ICONOGRAPHY: DERMATITIS THROUGH CONTACT -- AN UNUSUAL CLINICAL ASPECT. (*Iconografia Dermatologica: Dermatite da contatto, insolito aspetto clinico*). *Giorn. Ital. Dermatol.*, vol. 45:44-45, Jan. 1970. Translated from Italian. Leo Kanner Assoc., Redwood City, Calif., 5p., Jan. 1972.

A clinical case history is presented of a female patient studied during investigations of skin reactions during contact with and sensitization to nickel. Results of laboratory hematological examinations are given, and the skin lesions are described. Allergometric tests were done and they brought to light a positive reaction to nickel. Histological tests, performed on a papulous thigh element, revealed the skin to be thickened by hyperkeratosis, with hypergranules and pronounced papilloma. The clinical characteristics of the case are compared to those cases where normal morphology, typical of dermatitis created by metal contact, was determined.

28008

APTIC NO. 49699

Kleinerman, Jerome

EXPERIMENTAL STUDIES RELATING TO THE PATHOGENESIS OF EMPHYSEMA. *Preprint, American Medical Assoc., Chicago, Ill.* 8p., 1970. 22 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5, 1970.)

The biochemical approach to the experimental production of emphysema is reviewed with respect to the pathological changes involved. The pathogenesis of the disease was studied in a series of animal experiments to determine the vulnerable sites in the lungs and the mechanisms of disease progression. The effects of nitrogen dioxide were also examined with respect to the potential increase in proteolytic activity.

28009

APTIC NO. 49701

Macklem, Peter T.

AIRWAY RESISTANCE AND COLLATERAL VENTILATION. *Preprint, American Medical Assoc., Chicago, Ill.* 9p., 1970. 4 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5, 1970.)

The relationship between airway resistance and collateral ventilation is reviewed. Unequally distributed obstruction within peripheral airways results in pressure differences between alveoli subtended by obstructed airways and other alveoli with unobstructed airways. These pressure differences cause collateral flow whose magnitude is computed by the pressure difference across the alveolar wall divided by the resistance to the collateral flow. Provided the time constant for collateral ventilation is sufficiently low, the tidal volume delivered via collateral channels will be nearly equal to its normal volume. The factors determining the time constant and the speed of occurrence of collateral ventilation are the resistance to collateral flow and the compliance of the collaterally ventilated space.

28010

APTIC NO. 49780

Penman, H. G. and K. J. Thomson

PULMONARY ASBESTOS IN DUNEDIN, NEW ZEALAND, ASSESSED BY TWO METHODS. *Pathology*, no. 2:175-182, 1970. 18 refs.

One hundred adult hospital patients, aged 36-92 years old, were examined at autopsy for pulmonary asbestos in Dunedin (New Zealand), a town of 110,000 inhabitants, without heavy industries. Only three out of 100 adults were found to harbor asbestos bodies in the lungs as judged by examination of 30-micron sections. A much more sensitive method, involving digestion of lung tissue and examination of the residue, revealed asbestos bodies in 43 of the first 50 subjects, i.e., over 85%. In nearly all cases these bodies were few. Associated pleural plaques were seen only once in the whole series of 100. Uniformity of technique is necessary if results of work at different times and in different places are to be comparable. Reliance on 30-micron sections alone may lead to failure in detection of biologically important number of asbestos bodies.

28011

APTIC NO. 49700

Proctor, Donald F., Solbert Permutt, Betty Kelly, and Patricia S. Murtagh

THE STUDY OF BRONCHIAL CALIBER IN EXCISED DOG LOBES. *Preprint, American Medical Assoc., Chicago, Ill.* 4p., 1970. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5, 1970.)

The parameters that determine airway caliber also effect the distribution of ventilation, the resistance to air flow, and breathing. These include the elastic forces from the surrounding lung tissue; the normal tone, constriction, or relaxation of the bronchial smooth muscle; and the surface tension of the fluid that lines the internal surface of the bronchi. Bronchial caliber in excised dog lobes was studied to determine the interplay of these factors. Atelectatic lung tissue exerted a constrictive effect on bronchial diameter, and alveolar inflation produced the reverse effect; this occurrence was in relation to the lung volume. Bronchoconstrictor agents decreased bronchial calibers at all transpulmonary pressures studied and were capable of producing total bronchial closure of all airways beyond the lobar bronchus.

28012

APTIC NO. 49670

Suzuki, Tatsuo

MANGANESE POLLUTION OF THE ENVIRONMENT.

(*Mangan ni yoru kankyo osen ni tsuite*). *Sangyo Igaku (Jap. J. Ind. Health)*, 12(11):529-533, Dec. 1970. 11 refs. (Presented at the Japan Industrial Medicine Association Meeting, 43rd, Tokushima, Japan April 1, 1970.) Trans-

lated from Japanese. Scientific Translation Service, Inc., Santa Barbara, Calif., 11p.

Manganese pollution of the environment in Japan is discussed. The effects of manganese present in the soil, air, plants, animals, and man are reviewed. Data are given for the amount of manganese found in soil at different distances from manganese plants, and in cryptomeria leaves. Manganese emission limits are presented. The relationship between manganese and pneumonia, and the occurrence of manganese poisoning were investigated. Plant employees and residents around the manganese plants were tested; the results of the health survey are presented.

1969

28013

APTIC NO. 49470

Amanat, Mohammad Sharif

EFFECTS OF AIR POLLUTANTS ON MONOMOLECULAR SPREAD FILMS. Columbia Univ. N. Y., Faculty of Pure Science, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1969, 87p. 107 refs.

Monomolecular films of stearic acid, phospholipids, proteins, and lipoproteins were used as biological models to study the effect of air pollutants such as olefins and nitrogen dioxide on cell membranes. These film-pollutant interactions were studied using surface pressure measurements. Films of stearic acid and dipalmitoyl lecithin showed no interaction with any of the pollutants tested. However, films of egg lecithin and phosphatidyl ethanolamine showed significant expansion in the surface pressure-surface area curves, on exposure to all test atmospheres containing NO₂. Olefins, alone or in combination with NO₂, had no effect on the above curves of these films. The observed effects of egg lecithin and phosphatidyl ethanolamine films appear to be the result of NO₂ interaction with the double bonds of the fatty acyl chains of these phospholipids rather than simple physical penetration. It appears that some component of the capillary cell membranes (an unsaturated phospholipid) rather than the lung surfactant (a saturated phospholipid), is the primary site of pollutant attack. The extent of interaction of NO₂ with either egg lecithin or phosphatidyl ethanolamine was related to the degree of unsaturation of their fatty acyl chains. Whereas the unsaturated phospholipids and natural lipoproteins show expansion in their surface pressure-surface area curves on exposure to NO₂, a condensation was noted in the case of protein films, and while NO₂ showed no effect on the protein-dipalmitoyl lecithin film, an expansion of the protein-phosphatidyl ethanolamine film was observed. Thus it appears that the protein interaction may be totally inhibited when the protein is spread on phospholipids. The in vivo effects of NO₂ on some enzyme systems may be the result of NO₂-lipid interaction. In addition, various changes in cell membrane characteristics, e.g., permeability, may also take place and thus lower the resistance of the living organisms. Experiments utilizing spread films of phospholipids extracted from *E. coli* grown at 15 C and 37 C demonstrate that simple changes in environmental conditions, e.g., temperature, may affect markedly the interaction of air pollutants such as NO₂ with biological membranes.

28014

APTIC NO. 49669

Caujolle, F., N. P. Buu Hoi, Pnam Huu, and M. Renson

BIOCHEMISTRY COMPARED TOXICITY OF O-(METHYLSELENO) BENZOIC ACID AND OF O-(METHYLTELLEURO) BENZOIC ACID. (*Toxicité comparée de l'acide o-(méthylsélénio) benzoïque et de l'acide o-(méthyltelluro) benzoïque*). C. R. Acad. Sci. (Paris), vol. 268:2807-2810, June 9, 1969, 2 refs. Translated from French. Leo Kanner Assoc., Redwood City, Calif., 6p., May 1971.

The toxicity of o-(methylseleno) benzoic acid and o-(methyltelluro) benzoic acid were compared. Studies were made on the

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sodium salts of acids (III) and (IV), and the compounds toxicity was studied in male and female albino mice. The exposure and treatment procedures are described. Death percentages over a 24-hour period as a function of the various dosages of sodium salts of acids (III) and (IV), and the toxicological characteristics of these solutions are presented. The O-(methylseleno) benzoic acid proved less toxic than o-(methyltelluro) benzoic acid. The toxicity ratio of DL50 sodium salts of these two acids was around 1.68. The seleno compound toxicity occurred more rapidly. No specific anatomopathologic lesions due to the toxicity were observed.

28015

APTIC NO. 49655

Gordynya, R. I.

THE INFLUENCE OF A FOOD RATION WITH NICKEL SALTS ADDED ON CARBOHYDRATE METABOLISM IN TEST ANIMALS. (*Vliyaniye pishchevogo ratsiona s dovavkoy soley nikelya na uglevodnyy obmen u podopytnykh zhivotnykh*). Vop. Ratsion. Pitan., no. 5, 167-170, 1969. Translated from Russian, 5p.

The influence of nickel salts added to the food ration on the carbohydrate metabolism of male rabbits was investigated. The animals were divided into three groups and fed on a diet of oats, plants with edible roots, green fodder or hay, and concentrated feed. The daily ration contained a mean of about 10 micrograms of nickel. In addition, the additives to the ration included a daily peroral injection into the stomach of a solution of nickel chloride, converted to pure nickel, in the following quantities: group I -- control group, group II -- 10 micrograms/kg, group III -- 500 micrograms/kg. Experiments lasted for 5 mo. The carbohydrate metabolism state was determined from the content of glycogen in the liver and muscles, from the level of sugar in the blood, and by employing a galactose loading test. The nickel dosage of 500 micrograms/kg over an extended period of time has an influence on the state of the carbohydrate metabolism among test animals, resulting in a significant reduction in the content of glycogen in the liver, moderate hyperglycemia, and deposits of glycogen in the muscles.

28016

APTIC NO. 49976

Hodgson, Thomas A., Jr.

THE EFFECT OF AIR POLLUTION ON MORTALITY IN NEW YORK CITY. Cornell Univ., Ithaca, N. Y., Dept. of Public Health, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1969, 179p. 89 refs.

Relationships between sulfur dioxide and particulate matter levels and mortality in New York City were studied for a 2.5-year period. While it was not proved that air pollution in general and particulate matter and SO₂ in particular cause mortality, there were indisputably more deaths the greater the concentration of atmospheric pollution. If air pollution causes the observed variation in mortality, and if particulate matter and SO₂ at least reflect the presence of the harmful environmental factors, then a slight or moderate increase in the concentration of air pollution during a month can be expected to result in increased mortality from heart and respiratory diseases. Deaths are occurring when there are slight and seemingly innocuous, non-episodic increases in concentration from day to day and month to month. An air pollution season during the months October or November through March or April was distinguished. Differences between two consecutive pollution seasons with comparable pollution levels regarding mortality rates from heart and respiratory diseases may indicate that mortality rates in one period of time may be a function of pollution level having occurred in a previous period. Changes in the level of pollution may in themselves influence the level of mortality.

EFFECTS-HUMAN HEALTH

28022

28017

APTIC NO. 49668

Khrolenko, Ye.

INJURY TO THE NERVOUS SYSTEM IN ACUTE CARBON MONOXIDE POISONING. (*Porazheniye nervnoy sistemy pri ostrom otravlenii ugarnym gazom*). *Klinich. Med.*, vol. 47:130-131, May 1969. Translated from Russian. Scientific Translation Service, Inc., Santa Barbara, Calif., 4p.

The physical condition of a female patient with the severest degree of carbon monoxide poisoning was described. The patient had closed the flue of a burning stove; the next day the patient was found unconscious, and remained in a coma for about 20 days. Injury to the nervous system after the comatose condition ended was characterized by short-term asthenia, amnesia, neuritis of the right fibular nerve, and a syndrome of diffused encephalomyelitis with functional disturbance of the pelvic organs and with tropic disorders. The most clearly indicated was the syndrome of injury to the pyramid tract at the level of the cervical-pectoral section of the spinal cord with low spastic paralysis in the absence of conductor sensory disorders. Considering the good regress of spinal injuries, it was assumed that they were probably connected with vascular disturbances.

28018

APTIC NO. 49662

Orlova, A. A. and K. V. Glotova

CHANGES IN THE HEART CAUSED BY CHRONIC BERYLLIUM SICKNESS. (*Izmeneniya v serdtse pri khronicheskom berillioze*). *Gigiena Truda i Prof. Zabollevaniya*, vol. 13:32-35, 1969. 10 refs. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 13p.

Changes in the heart caused by chronic beryllium sickness is discussed. Beryllium sickness is characterized by infection of the lungs and the development of respiratory insufficiency at an early stage. Symptoms also include collagenosis, subfebrile temperatures, weight loss, destruction of the proteometabolism, hepatolienal syndrome, lymphopathy, and the development of cardiopulmonary insufficiency. Forty-five patients were examined (20 males and 25 females), all of whom had contact in the past with metallic beryllium powder or with its oxide. Patients were divided into three groups, corresponding to the three stages of the illness. Clinical reports on each patient were made. Changes in the heart were characterized primarily by clinical, cardiographic indications of chronic cor pulmonale, the frequency and severity of which increased in direct proportion to the stage of illness. Cor pulmonale was diagnosed in 33% of the cases examined. Some changes were observed which were associated with primary myocardial dystrophy, which developed as a result of the definite allergic symptoms which characterize chronic beryllium sickness.

28019

APTIC NO. 49667

Takamatsu, Isao, Masashi Takeichi, and Akira Yukitake

NEUROPATHOLOGY OF EXPERIMENTALLY INDUCED CARBON MONOXIDE POISONING. *Shinkei Kenkyu No Shimpo Advan. Neurol. Sci.*, no. 13:56-62, April 1969. 13 refs. Translated from Japanese. Scientific Translation Service, Inc., Santa Barbara, Calif., 24p.

Neuropathological studies of experimentally induced carbon monoxide poisoning are discussed. Time studies were conducted, using grown cats, from the standpoint of cerebral physiology, histopathology, and electron microscopy. Conditions for the incidence of sequelae were presented, and the pathological changes in the nervous, respiratory and cardiovascular systems were outlined. Observations were made by a light and by an electron microscope. Experimental procedures and results are described.

28020

APTIC NO. 49734

Wehner, Alfred P.

ELECTRO-AEROSOLS, AIR IONS AND PHYSICAL MEDICINE. *Am. J. Phys. Med.*, 48(3):119-149, 1969. 226 refs.

Physical, technical, and scientific aspects of electro-aerosols and air ions are reviewed and discussed. A review of physiological effects of these agents as reported in the international literature is followed by a discussion of technical and other problems contributing to the controversy in this field. Proper techniques for exposure to electro-aerosols are outlined. While it is generally recognized that electric charges on aerosol particles affect characteristics and behavior of the aerosol, the physiological effect of these electric charges are more complex, controversial, and sometimes inconsistent. Unipolar electric charges on aerosol droplets have local effects on physiology and biochemistry of cells and tissues, on ciliary activity, mucus flow, smooth muscle tone, permeability of cell membrane, enzyme activity, cell metabolism, and adenosine triphosphate metabolism, as well as central effects on physiology and biochemistry of the organism via the central nervous system and autonomic nervous system, including physical activity, performance, hemogram, blood pressure, heart rate, basal metabolic rate, hormone levels, and electrodermatogram. Electro-aerosol therapy of cases of emphysema, chronic bronchitis, respiratory allergies, and other respiratory diseases is promising.

28021

APTIC NO. 49781

Xipell, J. M. and P. S. Bhathal

ASBESTOS BODIES IN LUNGS: AN AUSTRALIAN REPORT. *Pathology*, no. 1:327-330, Oct. 1969. 19 refs.

Asbestos bodies were determined in unselected lung necropsies in Melbourne. A block of tissue was taken from the posterobasal subpleural zone, and the sample was scanned by a modification of Gold's alkaline digestion technique. Only typical and complete asbestos bodies as originally illustrated by Gloyne were counted. Asbestos bodies were found in 43.5% of 200 necropsies, occurring in 44.2% of 138 males and in 41.9% of 62 females. The tendency for positive results to be higher in the age group 51 to 80 corresponds to the general trend in other series.

1968

28022

APTIC NO. 49675

Mueller, R. and G. Breucker

COBALT AS AN OCCUPATIONAL ECZEMATOGEN AND AS COUPLING ALLERGEN WITH CHROMIUM AND NICKEL. (*Kobalt als arbeitsbedingtes Ekzematogen und als Koppelungsallergen mit Chrom und Nickel*). *Dermatol. Wochenschr.*, 154(12):276-282, March 23, 1968. 45 refs. Translated from German. Leo Kanner Assoc., Redwood City, Calif., 12p., Jan. 1972.

Cobalt as an occupational eczematogen and as a coupling allergen with chromium and nickel was investigated. On 92 (9.1%) out of 1006 patients with contact eczema who were examined, a cobalt allergy was proven by the patch test. With 79 patients indications for the cause of cobalt sensitization were found in the anamnesis with most cases due to contact with cement (29%), metals and oils (16.2%), and synthetic washing agents (16.6%). Special attention was called to a group of four patients where the sensitization could be traced back to contact with cobalt containing mixed provender for ruminants. The occurrence of combined sensitization towards cobalt, nickel, and chromium in the individual occupational groups was also investigated, whereby the dependence of sensitization on exposure emerged as an argument in favor of the theory of coupling allergy.

28023

APTIC NO. 49659

Castellino, N. and S. Aloj

THE DISTRIBUTION OF LEAD (PB 210) IN THE SUBCELLULAR FRACTIONS OF THE RAT S LIVER AND KIDNEYS. (*La distribuzione del piombo (Pb210) nelle frazioni subcellulari di fegato e di rene di ratto*). *Folia Med. (Naples)*, 50(4):209-228, April 1967. 72 refs. Translated from Italian, 21p.

The lead distribution in subcellular fractions of the liver and kidneys of rats was investigated. Several groups of rats were used which were injected intravenously with 100 micrograms of lead acetate (Pb210). The subcellular fractions, such as nuclei, mitochondria, microsomes, and cell sap were obtained by differential centrifugation of the liver and kidney homogenates. On each fraction the Pb210 and the proteic nitrogen amounts were dosed and the results were expressed as percentages of the lead and proteic nitrogen in the whole homogenates. The lead was embodied in the cells more slowly (being present in the all fractions considered 1 hr after the dose administration), and the bond of lead within the mitochondria was particularly durable. Only 20% of the radioactivity could be removed from the mitochondrial fraction by repeated washings with saccharose 0.25M, EDTA 0.001 M, and DTPA 0.001 M. This result suggests that the lead crosses both external and internal mitochondrial membranes, entering within the mitochondrial matrix.

28024

APTIC NO. 49660

Castellino, N.

AUTORADIOGRAPHIC RESEARCH ON THE DISTRIBUTION OF PB210 IN THE BODY TISSUE OF THE RAT. (*Ricerche autoradiografiche sulla distribuzione del Pb210 nel tessuto osseo del ratto*). *Folia Med. (Naples)*, vol. 50:116-125, Feb. 1967. 7 refs. Translated from Italian, 11p.

The distribution of lead 210 (Pb 210) in bony tissues of rats killed 1, 6, 15, and 30 days after a 100-microgram animal lead injection was investigated. During the observation time calcium nitride ethylenediaminetetraacetic acid was also administered to some experimental animals at will in the drinking water. The results showed that lead had accumulated in the bony tissue, and that it was not removed from CaN2EDTA. By using autoradiograms of thin slices of bone included in Araldite M it was possible to demonstrate that lead was kept in the spongy tissue of the flat bones and of the vertebrae, in the osseous diaphysary and epiphyseal laminae (compact and spongy tissue), and in connecting cartilages.

28025

APTIC NO. 49474

Crandell, Merrell Edward

THE RETENTION BY HUMANS OF INHALED AIR IONS AND SOME RESULTING CARDIAC EFFECTS. *Syracuse Univ., N. Y., Dept. of Physics, Thesis (Ph.D.)*, Ann Arbor, Mich., Univ. Microfilms, Inc., 1967, 88p. 45 refs.

The retention of inhaled air ions by humans, and the physiological, especially cardiac, effects, of inhaled air ions on humans were studied. Measurements of the number of air ions inhaled and exhaled by humans showed good agreement with the Wilson-Withby theory. With proper application of inhalation techniques, some 80% of the ions inhaled are retained, and a large number of them remain in the respiratory tract. Thus, the electric fields present throughout the respiratory tract may cause some physiological effects. Fluctuations in the respiration and pulse rates during ion inhalation were the most significant effects. There was a tendency for the pulse rate under negative ion dosage to be higher than that under positive ion dosage. This tendency, if it is significant, appears to be dependent on the subject and on the order in which the dosage

was administered. The most significant effects in terms of the electrical activity of the heart appeared in the depolarization and repolarization of the ventricles as evidenced by electrocardiograms. The fluctuations in both magnitude and direction appeared to be greater during ion inhalation than during control runs. When going over from negative ion inhalation to positive ion inhalation, a counter clockwise rotation of the ventricle repolarization wave was observed. This latter wave was slightly higher with positive ion inhalation than with negative ion inhalation. Both of these effects were small and, due to the limited number of subjects used, they cannot be taken as conclusive evidence of an effect. The Tschijewski theory of ions entering the blood stream does not seem to be the dominant explanation for air ion effects on the heart.

28026

APTIC NO. 49666

Jordi, A.

DAMAGES TO THE NERVOUS SYSTEM THROUGH INDUSTRIAL POISONS UNDER SPECIAL CONSIDERATION OF EARLY SYMPTOMS. *Praxis (Bern)*, 56(4):610-618, May 1967. 17 refs. Translated from German. Sanzare Assoc., Philadelphia, Pa., 20p.

Damages to the nervous system through industrial poisons and early symptoms of toxicity are discussed. The occurrence of chronic carbon monoxide poisoning is reviewed. First symptoms of carbon monoxide poisoning and of hypoxaemia, caused by lowering of the O2-partial pressure alone, are a reduction in the visual faculty, reduction in perception, concentration, and judgement. The importance of smoking before, during, and after staying in CO-containing air or in an atmosphere with reduced O2-partial pressure are reviewed. Experimental investigations of the United States Air Force of crews after long flights in high altitudes with smoking and non-smoking occurring, and the difference in O2 consumption among small people, children, and small warm blooded animals are also reviewed. Poisoning through organic technical solvents was discussed. Lead and mercury show the same symptoms during early and final stages: neurasthenic and psychoorganic syndromes. The responsiveness of the human organism is retarded. The peculiarities of methyl alcohol and its chlorine and bromium esters were indicated: none or hardly noticeable sensations during breathing and accumulation and retention of toxic quantities through both uninjured and injured skin. The formation of blisters and the resorption of methyl bromide through the skin was noted.

1966

28027

APTIC NO. 49661

Karamzina, N. M. and I. V. Pavlova

OXIDATION PROCESSES IN THE LUNGS OF RATS FOLLOWING POISONING WITH BERYLLIUM COMPOUNDS. (*Okislitel'nyye protsessy v legkikh krysy pri intoksikatsii nekotorymi soedineniyami berilliya*). *Gigiena Truda i Prof. Zabolevaniya*, vol. 10:32-36, 1966. 5 refs. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 8p.

Oxidation processes in the lungs of rats following poisoning with beryllium compounds are investigated. The experimental procedure and exposure methods are described. The experiments were conducted with 112 male white rats which were dosed intratracheally with beryllium compounds. Beryllium oxide and a mechanical mixture of metallic beryllium with aluminum caused a sharp increase in the weight of their lungs and inhibition of the oxidation of alpha-glutaric and malic acids by the enzymes of the lung tissue. Beryllium-aluminum alloys affected the oxidation processes to a lesser extent with metallic beryllium and its oxides. The inhibition of the oxidation of alpha-ketoglutaric acid was much less pronounced and occurred much later than upon the introduction of beryllium oxide; oxidation of malic acid on the introduction of beryllium alloys did not change. The decrease of the inhibitor of the ox-

idation processes of beryllium, when it was alloyed with aluminum, apparently resulted from changes of the properties of this metal and not from the competing effects of both cations.

28028

APTIC NO. 49664

Proosdij-Hartzema, E. G. van

BORIC ACID POISONING. (*Boorzuurvergiftigen*). *Ned. Tijdschr. Geneesk.* (Haarlem), 110(5):7p., Dec. 24, 1966. Translated from Dutch. Scientific Translation Service, Inc., Santa Barbara, Calif., 27p.

Boric acid poisoning is discussed. A survey of the literature on poisoning due to the medical use of boric acid is presented. Poisoning by new boron compounds in industry is reviewed, especially boranes, which include diborane, pentaborane, and decaboranes. The boranes are boron hydrides and boron hydrogens. Symptoms and treatment of acute and chronic boron poisoning are presented. Acute symptoms include nausea, vomiting, bloody diarrhea, a rise in body temperature, the appearance of a generalized erythema, headache, restlessness, impairment of the kidney function, convulsions, delirium, coma, and shock; chronic symptoms include gastro-intestinal disorders, nausea and vomiting, lack of appetite, a heavy feeling, sometimes pain in the stomach region and diarrhea, skin disorders, drying of the mucous membranes, hair becoming dry and dull and falling out, and impairment of the sebaceous gland. Treatment in acute poisoning is exclusively symptomatic.

1965

28029

APTIC NO. 49676

Bassleer, R.

TISSUE CULTURE: THE EFFECTS OF BERYLLIUM ON THE SYNTHESIS OF NUCLEAR PROTEIN AND OF DEOXYRIBONUCLEIC ACID FIBROBLASTS CULTIVATED IN VITRO. (*Culture de Tissus. Effets du beryllium sur les synthèses de protéines nucléaires et d'acides désoxyribonucléiques dans des fibroblastes cultivés in vitro*). *Compt. Rend. Soc. Biol. (Paris)*, vol. 159:1620-1623, 1965. 10 refs. Translated from French. Leo Kanner Assoc., Redwood City, Calif., Sp., March 1972.

The behavior of the total nuclear protein in mammiferous cell places in vitro in the presence of beryllium was investigated. Rat fibroblasts were cultivated for 4 days in the presence of beryllium sulfate with a final concentration of M/400. The culture technique is described. The total nuclear proteins (excluding the nucleoli) were analyzed by inferential microscopy, and the ADN was analyzed by cytophotometry after a Feulgen reaction. Beryllium provokes in rat fibroblasts an inhibition of the mitotic activity and a considerable reduction of the ADN and nucleolar protein synthesis. The nuclear protein synthesis did not appear to be affected, because the nucleus quantity in these substances, excluding the nucleoli, tended to quadruple. The end of cellular multiplication was not caused by preprophase block but by a severe inhibition in the ADN synthesis. The nucleolar preparation for mitosis seemed also greatly compromised.

28030

APTIC NO. 49665

Mesz, Berta, Carlos A. Canepa, and Estela R. Gimenez

BORIC ACID INTOXICATION. (*Intoxicacion por acido bórico*). *Arch. Argentinos Ped.*, 63:156-158, March-April 1965. 12 refs. Translated from Spanish. Translation Consultants, Ltd., Arlington, Va., 7p.

A case history of boric acid poisoning of a male infant is presented, and boric acid poisoning is discussed. The infant was diagnosed as having intergluteal dermatitis caused by a species of *Candida*. A physical and laboratory examination was given upon admission, measuring cardiac and respiratory rates, and investigating the presence of boric acid in the blood and urine. Results of the tests and prescribed treatment for the

condition were given. Boric acid, its characteristics, and influence on tissues and body fluids were discussed. Its absorption through the skin and subsequent elimination through urine, perspiration, and milk are reviewed. Quantitative and qualitative techniques to determine the presence of boric acid are compared, and toxic and lethal doses and mortality are considered. Boric acid intoxication is characterized by a variety of symptoms, including: cutaneous symptoms of erythematous types with varying characteristics, generally of the scarlet form and phlyctenular types, erosive lesions in the mouth and diaper rash; digestive symptoms of diarrhea, vomiting, melena, hematemesis, and hemorrhagic enteritis; renal symptoms with dehydration, oliguria, cylindruria, albinism, and hematuria; and nervous symptoms of coma, convulsions, somnolence, and shock.

1964

28031

APTIC NO. 49637

Roshchin, I. V.

VANADIUM METALLURGY IN THE LIGHT OF INDUSTRIAL HYGIENE AND QUESTIONS CONCERNED WITH THE PREVENTION OF OCCUPATIONAL DISEASES AND INTOXICATION. (*Metallurgiya vanadiya v svete gigieny truda i voprosy profilaktiki professional'nykh zabolevaniy i intoksikatsiy*). *Gigiena Truda i Prof. Zabolevaniya*, no. 8:3-10, Sept. 1964. 3 refs. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 15p.

The quantitative content of aerosols in the atmosphere of vanadium smelting plants was investigated, as well as the physical properties and the chemical composition of the dispersed aerosol phase. Employees health was systematically examined to determine the incidence of occupational diseases and poisoning which was attributed to the effects of composite aerosols and those of vanadium compounds. Maximum permissible concentrations of iron oxide dust-containing admixtures of associated metal oxides, of vanadium slag, and vanadium trioxide dust are presented. By analyzing work conditions and the state of health of the workers, certain measures called to prevent occupational diseases and poisoning were determined.

1962

28032

APTIC NO. 49830

Ruocco, Joseph N.

EFFECT OF IONIZED AIR ON VISUAL REACTION TIME OF HUMAN SUBJECTS. *Fordham Univ. New York. Dept. of Experimental Psychology. Thesis (Ph.D.). Ann Arbor, Mich., Univ. Microfilms, Inc., 1962, 114p. 34 refs.*

Effects of ions on reaction time and well-being, as well as the possibility of perception of the presence or absence of ions, positive or negative, were studied on seven adult male subjects. Each of them was exposed for 1 hr to negative, positive, and control (zero) atmospheric ionization under conditions of oral and nasal inhalation and a disjunctive reaction time test administered after rest and after a 2-minute, step-exercise. The experiment was a complete factorial design with one replication. At the end of each test period, each subject completed a questionnaire inquiring as to his relative state of well-being and his ability to detect the specific ion condition or the absence of ionization. Ions, alone and in interaction with respiratory modes and activity levels, failed to show any consistent effect on human reaction time. The subjects were not able to detect the presence or absence of ionization. Nor did ions have any discernible effect on expressed estimates of well-being as measured by the Adjective Check List.

1955

28033

APTIC NO. 49865

Satake, S.

CONCERNING THE CASES OF ARSENIC POISONING CAUSED BY PREPARED POWDERED MILK. (*Chosei funnyu ni kiin suru hiso chudoka kanja ni tsuite*). Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 2(11):22-24, 1955. Translated from Japanese. Translation Consultants, Ltd., Arlington, Va., 13p.

Between late June and Oct. 1955, 9718 infants in the Chugoku region of Japan became ill following the chronic ingestion of powdered milk contaminated with arsenic. By Oct. 11, there were 62 confirmed deaths among the infants. The affected area covered 27 Prefectures including Okayama, Hiroshima, and Hyogo Prefectures, which reported 1797, 1615, and 1107 cases, respectively. The source of the arsenic was the sodium phosphate used as a stabilizer in the raw milk and which contained 3-8% arsenic trioxide. Based on quantitative analysis by the Gutzeit method, the final powdered milk product contained 0.01-0.07 mg of arsenic trioxide. Assuming the ingestion of 100 g milk/day, the arsenic trioxide dosage was 1-7 mg/day or 5-6 times the maximum daily dosage for an infant. In most cases, the ingestion of 3-10 cans of milk was required before symptoms of arsenic poisoning appeared. Characteristic symptoms were blackening of the skin, enlargement of the liver, persistent diarrhea, and anemia. With anemia there was reduction in red blood cells, white blood cells, and hemoglobin. Blood transfusions, iron, and pharmaceutical acid were administered for treatment of anemia, while vitamins, 2,3-dimercaptopropanol, fructose, methionine, and gluconic acid were administered for detoxification and liver protection. More than half the patients had recovered by November, but some were still hospitalized for treatment. Autopsy and histological findings are presented for one patient who died.

1941

28034

APTIC NO. 49697

Fairhall, Lawrence F. and John W. Miller

THE DEPOSITION AND REMOVAL OF LEAD IN THE SOFT TISSUES (LIVER, KIDNEYS, AND SPLEEN). *Public Health Rept. (U. S.)*, vol. 56:1641-1650, Aug. 15, 1941, 9 refs.

The deposition and removal of lead in the soft tissues (liver, kidneys, and spleen) of rats was investigated. Rats were fed approximately 15 mg of lead carbonate each day for 6 weeks. Some rats were killed at the end of the experiment, while others were restored to a 14-day lead-free diet. A slight rise in the lead content of bone tissue was noted. A slight depression in blood calcium was noted in animals fed the lead diet compared with those restored to the normal diet. Lead ingestion caused severe injury to the cells of the renal convoluted tubules in 6 weeks. The damage was markedly reduced following return to a normal diet for 2 weeks. Significant pathologic changes in the spleen were reduced to some extent after the lead diet was withdrawn, but the approach to normal was not as marked as in the kidney. The reduction of lead in the soft tissues observed chemically paralleled the repair of injury produced by the lead. Chemical and pathological changes in the soft tissue appeared to be of a transient nature.

1939

28035

APTIC NO. 49671

Joetten, K. W., H. Reploh, and G. Hegemann

EXPERIMENTAL INVESTIGATIONS OF MANGANESE PNEUMONIA AND BASIC SLAG PNEUMONIA. (*Experimentelle Untersuchungen ueber die Manganpneumonie*

und ihre Beziehungen zur Thomasschlackenpneumonie). *Arch. Gewerbepathol. Gewerbehyg.*, vol. 9:314-336, 1939, 13 refs. Translated from German. Scientific Translation Service, Inc., Santa Barbara, Calif., 27p.

Manganese pneumonia and basic slag pneumonia were investigated. Previous clinical studies of deaths due to lung inflammation of workers in brownstone and iron ore mines and experimental investigations of manganese and basic slag pneumonia are reviewed. Experiments were conducted on rabbits to determine pathological changes due to the inhalation of manganese dust, the significance of climatic factors and infection with pneumococci at the onset of manganese pneumonia, and the proportion of manganese dust needed to bring about pneumonia-like lung changes. The experimental procedure is described, and the mortality rates of rabbits, mice, and guinea pigs dusted with limestone, pure brownstone, 10% brownstone, and basic slag are presented. Lungs of the animals were analyzed microscopically. The harmful effect of manganese dust was increased by additional pneumococcal infection. The harmful effect consisted of a poisonous local effect on the cell which lead to the infection of the epithelial cell layer.

1936

28036

APTIC NO. 49673

Joetten, K. W. and Hans Poppe, ga

HYGIENIC AND EXPERIMENTAL STUDIES ON THE EXPERIMENTAL STUDIES ON THE EFFECT OF THOMAS SLAG DUST INHALATION ON THE ORIGIN OF LUNG INFLAMMATION. (*Hygienische und experimentelle Studien ueber den Einfluss der Thomasschlackenstaub-inhalation auf das Zustandekommen der Lungentzündung*). *Arch. Hyg. Bakteriol. (Munich)*, vol. 114-115:61-74, 1935-36. Translated from German. Scientific Translation Service, Inc., Santa Barbara, Calif., 16p.

The effect of Thomas slag dust on the occupational health of persons was investigated. Microscopic and chemical analyses of the dust were made; it consists of medium-sharp, hard to medium-sharp, and predominately rounded or blunt-edged soft particles which are soluble in water containing carbon dioxide. The quicklime, calcium sulfide, and calcium phosphide content of the dust was high. The dusts were also analyzed for the percentage of sulfur dioxide, manganese oxide, phosphoric anhydride, calcium oxide, magnesium oxide, and total iron, sulfur, and sulfide present in the dust. The relation of the dust content to worker's reports of catarrh of the upper respiratory tract, trachea or bronchi, or bronchial pneumonia, bronchiectasis, and emphysema were studied in four plants. Experiments were also carried out on guinea pigs, mice, rabbits, and dogs to study the effects of dust injury, exposure, and infection on the development of pneumonia. Results of the experiments are discussed.

EFFECTS-PLANTS AND LIVESTOCK

1973

28037

APTIC NO. 49528

Fujiwara, Takashi

EFFECTS OF NITROGEN OXIDES IN THE ATMOSPHERE ON VEGETATION. (*Chisso sankabutsu no shokubutsu ni oyobosu eikyo ni tsuite*). Text in Japanese. *Kogai to Taisaku (J. Pollution Control)*, 9(3):253-257, March 1973, 2 refs.

Rice plants, soybeans, sweet potatoes, sesames, tomatoes, eggplants, green peppers, cucumbers, strawberries, and grapes

were exposed to nitric oxide (20 ppm) for 7 hr in the presence of 0.75 l.3 ppm nitrogen dioxide, but did not show any sign of damage. However, when NO is oxidized and becomes NO₂, drastic damages occur on the plants. With NO₂ of more than 2-3 ppm concentration, plants receive damage similar to that from sulfides, spots in the initial stage, and gradual chlorosis. If the pollutant is eliminated after the initial spotting, the damage will disappear. The degree of damage depends on the specimen. When various plants are exposed to 4-10 ppm NO₂ for 4-8 hr, some damages are noted on soybeans and buckwheat in 4 hr at 4 ppm; the same damage occurs on grapes in 7 hr at 10 ppm. Most plants show damages in 30-60 min when exposed to 20-50 ppm. When exposed to low concentrations of NO₂ over a long period, tomatoes, eggplants, and buckwheat react to 0.6 ppm. The growth is hindered on buckwheat, eggplants, and radish. However, the rice plant increases the growth rate. Chlorophyll increases drastically in pinto bean leaves when they are exposed to 0.33 ppm NO for 10-19 days. When 12-15 ppm NO₂ coexists with 1.5-2.4 ppm of sulfur dioxide, the damages to string beans, tomatoes, cucumbers, and pepper multiply. The experiment on green pea exposure to 0.1 ppm SO₂ and 0.2 ppm NO₂ did not show the multiplication effect. However, an exposure to 0.1 ppm SO₂ and 0.1 ppm ozone showed a marked multiplied damage.

28038

APTIC NO. 49772

Kloke, A.

HEAVY METALS IN FOOD AND FODDER PLANTS.

(Schwermetalle in Nahrungs- und Futterpflanzen). Text in German. Deut. Lebensm. Rundsch., 69(1):45-49, 1973. 41 refs.

The concentrations of lead, cadmium, and mercury in food and plants are presently of major concern. The high concentration of lead in soil and plants is due to two sources, automobile exhausts and the lead industry. The normal lead concentration of plants is between 2 and 10 ppm. In the vicinity of highways and streets this value is two to three times higher. If it is assumed that the lead emission, by automobiles spreads to 50/m on both sides of the street or highway, then the Federal Republic of Germany has 750,000 hectare with lead polluted plants (3% of the agriculturally usable area). The sources for the cadmium pollution are also automobile exhausts the industry, and fuel oil. Lubricants, diesel oil, and fuel oils contain between 0.07 and 0.53 ppm cadmium. In the vicinity of streets the Cd concentration in plants rose from 0.22 ppm at 32 m to 1.45 ppm at 8 m from the highway. Canadian studies have revealed that at 15 m from a Cd-emitting plant 44 ppm Cd concentrations occurred in vegetation and at 90 m 0.45 ppm. The normal atmospheric concentration of mercury is 0.01 micrograms/cu m. In the air near mercury-emitting industries, concentrations up to 20,000 micrograms/cu m were measured.

1972

28039

APTIC NO. 49561

Bovay, E.

INDUSTRIAL FLUORINE EMISSIONS: THEIR EFFECTS ON PLANTS AND ANIMALS. (Les émissions fluorées industrielles: leurs effets sur les plantes et les animaux). Text in French. Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA, Basel, Switzerland, 1971, p. 163-184, 1972. 80 refs.

Emissions of fluorine compounds from metallurgical and chemical factories, particularly aluminum factories and phosphate fertilizer plants, are a source of pollution of a high grade of causticity with regard to vegetables, for very weak fluorine concentrations in the air, in the range of 1 microgram hydrogen fluoride/cu m of air. Some plants are even more sensitive to the effects of fluorine compounds, like apricot trees, vines, barberry, gladioli, the Liliaceous species in general, pine trees, Norway spruce, and other forest trees. These sensitive species form typical necroses on the edge or at the tip of

the leaves for fluorine contents in the dry matter lower than 50 mg/kg. The topographic situation of the factories plays an important part in the diffusion of gases. Fluorine intoxication (fluorosis) of animals originates most frequently from the absorption of fluorine compounds in fodder which originate from volatile F compounds issued by certain metallurgical and chemical factories. The symptoms of fluorosis include mottling and wearing of teeth, osteofluorosis, high fluorine content of bones and urine, and secondary effects like limeness and reduced milk production. The fluorine content of the total daily diet of milk cows should not exceed 30 mg/kg dry matter. Factories emitting F have generally taken precautions to reduce these emissions to 10-15%; however, a larger reduction must be reached in areas with highly F-sensitive plants.

28040

APTIC NO. 49814

Dunning, John A., David T. Tingey, and Walter W. Heck

FOLIAR SENSITIVITY OF LEGUMES TO OZONE AS AFFECTED BY TEMPERATURE, POTASSIUM NUTRITION AND DOSE. Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Div. of Ecological Research and Environmental Protection Agency, Research Triangle Park, N. C., Plant Science Research Div., 22p., 1972 (?). 14 refs. (North Carolina State Univ. Agricultural Experiment Station Journal Series, Paper 3931.)

Pinto beans and soybeans were exposed to ozone to determine the interactions of growth temperature, exposure temperature, potassium nutrition, and doses of ozone on their foliar sensitivity. Pinto beans developed more foliar injury than soybeans. Both species were more sensitive when grown and exposed at 28 C than at 20 C. Growth and exposure temperature interacted in the development of foliar injury in the pinto bean, but only growth temperature affected the amount of injury in the soybean. Both species developed more foliar injury when grown with low potassium nutrition. Foliar injury and reducing the sugars or sucrose content of the leaves were not related. (Author abstract modified)

28041

APTIC NO. 49374

Hanson, George P. and Linda Thorne

VEGETATION TO REDUCE AIR POLLUTION. Lasca Leaves, 22(3):60-65, Sept. 1972. 11 refs.

Several plant and tree species were tested for ozone tolerance and sensitivity levels to determine the absorption potential of these species for pollutants. Pollutant uptake was measured in units of diffusion resistance. The greater sensitivity of the plant to ozone injury, the greater the efficiency for pollution absorption and the lower the diffusion resistance. Mechanisms of physiological tolerance to ozone included extreme ozone sensitivity of guard cells; a higher fatty acid content; and a higher ascorbic acid content. Based on theoretical calculations, a belt of 20,000 trees well spaced from one another would absorb an estimated 90 lbs of ozone daily.

28042

APTIC NO. 49294

Kano, Fumio

THE EFFECTS OF OXIDANTS ON THE PHYSIOLOGICAL FUNCTION OF THE SLIME MOLD. (Nenkin no seiri kino ni oyobosu okishidanto no eikyo). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 220. (Nov. 7-9, Paper 174.)

The effects of oxidants on myxomycetes were studied. Physarum polycephalum was chosen as a test species, and the movements under the influence of oxidants (mainly ozone) were studied. The test material was placed in a glass exposure chamber, and ozone was supplied. Ordinarily, the cycle of the movement of myxomycetes consists of a long stride of the tip part and a short retrieval by the back. Advance is made by the difference of the two steps. Under the influence of ozone, the cycle reversed and the tip retreated. The gell portion

thickened. The membrane of myxomycetes seemed to be extremely sensitive to ozone.

28043

APTIC NO. 49475

Munshower, Frank Forrest

CADMIUM COMPARTMENTATION AND CYCLING IN A GRASSLAND ECOSYSTEM IN THE DEER LODGE VALLEY, MONTANA. *Montana Univ., Missoula, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., June 1972, 114p. 66 refs.*

Distribution, compartmentation, and transfer of cadmium was studied in a grassland ecosystem where airborne cadmium from a zinc smelter has accumulated for approximately 50 years until permanent closure in 1969. Thus, it was possible to study the cadmium cycle under discontinued contamination conditions. The cadmium content in plant and animal tissue samples was analyzed by atomic absorption spectrophotometry. The soil reservoir of introduced Cd is restricted to the top 2-5 cm, is geographically distributed in relation to the smelter and prevailing winds, and normally is not transferred to lower soil horizons. This indicates that the only probable routes of Cd exit from this ecosystem will be by surface erosion or by cropping, and not by leaching from the soil. Analyses of plants grown in controlled Cd concentrations in nutrient solutions and soil cultures, and of plants collected in the field, established that Cd was absorbed and translocated by plants in a predictable manner. Plant Cd concentrations are a function of the Cd concentration of the root medium; time of collection during the growing season, and species. Grasshopper Cd concentrations, and the liver and kidney Cd concentrations of cattle, swine, and columbian ground squirrels, demonstrated Cd accumulation above plant Cd levels as a function of the animal's age. The presence of Cd in the kidney of red fox, badger, and weasel documented Cd transfer from herbivores to carnivores. A mathematical model of the ecosystem was developed depicting the system as a closed, self-contained unit. Concentrations and quantities of Cd in each ecological compartment were derived in terms of the Cd concentration at the lower trophic level, life span of the organism, and its biomass on an area basis. The half-life for the introduced Cd in the grassland ecosystem appears to be in excess of 1000 years, and shorter in cultivated lands. (Author abstract modified)

28044

APTIC NO. 49405

Ohi, G., H. Seki, H. Maeda, M. Fukuda, K. Akiyama, and H. Yagyu

THE PROCESS OF REGIONAL LEAD POLLUTION WHICH AFFECTED PIGEONS. (*Hato ni arawareta namari chiikiosen no keiro*). Text in Japanese. *Nippon Kosho Eisei Zasshi (Japan. J. Public Health)*, 19(10):415, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

Pigeons living in the central part of Tokyo, where lead pollution is increasing were compared with those living in the suburbs. Lead was measured by the dithizone method after collecting air at two suburban Tokyo areas and three of its urban areas. Lead in food, at each of urban and suburban area, was checked by the dithizone method after ashing the food. Lead in water was measured at the same places and checked by the dithizone method. By a balance study of pigeons and by assumptions of water and food intakes, lead amounts inhaled and ingested by pigeons were calculated with the aid of other data. Values of lead from air, food, and water for each of urban and suburban areas are shown in tabulations. Lead content in food is no different between urban and suburban areas. In air, the urban area had six times the lead pollution of the suburban area. A significant relation was seen between lead in the thighbone of pigeons and soluble ingredients.

150

AIR POLLUTION ABSTRACTS, JUNE 1973

28045

APTIC NO. 49291

Sato, Haruo

CULTIVATION OF LEMNA PAUCICOSTATA HEGELM WITH POLLUTED RAINWATER IN OSAKA. (*Aouki kusa no seiku sogai kara mita usui no osen to sono chiiki bunpu (Remuna tesuto ni yoru taiki osen no chosa (II))*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 223. (Nov. 7-9, Paper 177.)

Air pollution precipitates in the rain which cleans the air. Using rainwater sampled at 16 locations in Osaka city, *Lemna paucicostata* Hegelm (a drifting aquatic plant) was cultivated. Water was collected every 14 months, and an equal amount of plant food was added to the water. The results of growth varied from 2.3 to 4.5. In general, the growth rate was better toward the inland area, the eastern suburbs of Osaka; and growth rates were 2.3 or 2.5 closer to the shore industrial areas and central Osaka. The effects of copper, zinc, and other metal pollutants, and low pH are suspected; but the nature of the damages is probably extremely complex and multiplied by mutual reactions among the pollutants.

28046

APTIC NO. 49573

Sato, Y. and Y. Tsuji

FLUORIDES INFLUENCE ON FERTILIZATION AND APPEARANCE IN EARLY STAGES OF SEA URCHINS. (*Uni-ran no jusei oyobi hassei shoki ni yaisuru fukkabutsu no eikyo*). Text in Japanese. *Nippon Kosho Eisei Zasshi (Japan. J. Public Health)*, 19(10):427, Oct. 1972. (Presented at the Japan Society of Public Health, General Meeting, 31st, Sapporo, Japan, Oct. 25-27, 1972.)

The eggs and spermatozoa of sea urchins were used to observe fluoride's influence on fertilization. Additions of 5, 10, 25, 50, 100, 125, 250, 375, and 500 mg (F concentration: 22.6, 45.2, 113.0, 226.0, 452.0, 565.0, 1130.0, 1695.0, and 2260.0 ppm, respectively) were made to normal sea water of 100 ml. They were used as test groups and were compared with a control group. The rate of fertilization and state of appearance were judged from photographs. The fertilization rate was near 100% in the 0-250 mg groups and below 10% in 375-500 mg groups. The difference in the deposition time of eggs which were laid in the testing liquid prior to fertilization did not seem to affect the fertilizing rate. Three hours after the fertilization, eight-cell-terms were the majority in the 25-250 mg groups and 4-cell-terms showed a high rate in the 50-250 mg groups. Normal pluteus appeared in the control group after 48 hours and were also seen in the 5 and 10 mg groups at 88 and 30% rates, respectively. But embryos in 25-250 mg groups which are supposed to grow to normal pluteus did not appear at this moment. After 72 hours from the fertilization, embryos which started forming born structure were seen in each of the 0, 5, and 10 mg groups, also the abnormal born structure appeared in each of those groups at 30, 8, and 11% rates, respectively. Further, abnormal embryos were observed in all groups, especially with an extremely high rate in the 25-125 mg groups. Main stages of the process are shown in tabulations, graphs, and photos.

28047

APTIC NO. 49437

Sawada, Tadashi, Tetsuo Komeiji, Isamu Nouchi, Kuniko Oguchi, and Toshio Odaira

INJURY BY PHOTOCHEMICAL SMOG AS OBSERVED AND REFLECTED ON PLANTS IN TOKYO (2). (*Kokagaku sumoggu no eikyo to omowareru shokubutsu no higai jokyo ni tsuite (dainiho)*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 232. (Nov. 7-9, Paper 186.)

Plant damage was investigated in 78 communities in suburban Tokyo between Aug. and Oct. 1971. Five hundred and twelve samplings of 19 species of vegetables and plants were gathered. A total of 54 samplings of green vegetables, spinach,

turnips, scallions, radishes, corn, and morning glory showed some damage. Chlorosis and mottling were noted on many green vegetables. The damages on morning glory plants especially showed blackening of leaves on the morning after oxidant exposure, white spots appearing two days later, and the shapes of leaves changed into cups on upper stems. Necrosis symptoms appeared gradually, and in severe cases, the leaves fell off. The tree samples were mostly taken from parks. Zalcova trees and Carolina poplars were stripped from June to July in the total area, showing no geographical differences. However a high rate of necrosis of zalcova trees was noted in the area with a high sulfur dioxide concentration. An ozone exposure experiment was conducted on these plants and vegetables using an exposure chamber. Chlorosis and necrosis similar to the out of-door symptoms appeared on all vegetables and trees.

28048

APTIC NO. 49063

Stewart, Joseph K. and Frank Matoba

SOME FACTORS INFLUENCING THE SUSCEPTIBILITY OF LETTUCE TO CO₂ INJURY. *Plant Disease Repr.*, 56(12):1051-1054, Dec. 1972. 6 refs.

The differences in susceptibility to injury from increased concentrations of carbon dioxide, a normal respiratory product, in various lettuce cultivars were investigated. Lettuce was grown under commercial conditions, and the different lettuce varieties were exposed to different CO₂ tolerance. The lettuce grown in the Salinas Valley was more susceptible to CO₂ injury than that grown in the desert areas or in the San Joaquin Valley. Different test lots and cultivars also differed within a given production area.

28049

APTIC NO. 49085

Thomas, B., J. A. Roughan, and Evelyn D. Watters

LEAD AND CADMIUM CONTENT OF SOME VEGETABLE FOODSTUFFS. *J. Sci. Food Agr.*, 23(12):1493-1498, Dec. 1972. 24 refs.

The main source of lead contamination of the soil is aerial deposition from motor vehicles and industrial emissions. Urban soils can contain 17 times as much lead as rural soils. Cadmium also occurs in the soil from incineration of ferrous scrap, metallurgical processes, and as a result of its presence in motor vehicle oils and tires. Lead and cadmium in brussels sprouts, apples, pears, cabbages, potatoes, onions, leeks, carrots, swedes, watercress, frozen vegetables, cucumber, celery, tomatoes, mushrooms, and dried herbs were determined by atomic absorption spectrophotometry of the organic extract of the vegetables. The lead content of the 231 samples was in the range 0.01 to 3.85 ppm, with a mean of 0.05 ppm; the range and mean of the cadmium content were 0.01 to 0.22 and 0.04 ppm, respectively.

28050

APTIC NO. 49818

Tingey, David T., Richard A. Reinert, Carlos Wickliff, and Walter W. Heck

CHRONIC OZONE AND/OR SULFUR DIOXIDE EXPOSURES AFFECT THE VEGETATIVE GROWTH OF SOYBEAN. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C.*, 14p., 1972 (?). 16 refs.

Soybean varieties were exposed to ozone (5, 10 ppm), sulfur dioxide (5, 20 ppm), or a mixture of the two (5 and 5 ppm) to determine their effect on growth and foliar injury. Foliar injury was noted on both cultivars in the O₃ and O₃-SO₂ treatments, with the Dare cultivar sustaining greater injury. Plant height, top, root (both fresh and dry weights), and the dry shoot-root ratios were significantly reduced by the 10 ppm O₃ treatment. Exposure to O₃-SO₂ significantly reduced top fresh weight, root fresh and dry weights, and shoot-root ratios. Treatments of 5 ppm O₃ or 5 and 20 ppm SO₂ had no significant effect on plant growth. The growth reductions due to the O₃-SO₂ treatment were greater than the additive reductions of the single gases. (Author abstract modified)

22051

APTIC NO. 49434

Tsunoda, Fumio, Hiroko Kunida, Yoshizo Sato, Kazuo Sasaki, Yuzo Kawarada, Isao Kimura, Morio Murakami, Hifumi Shioi, and Takenori Yoshida

CASE STUDY OF THE DISSECTION OF A CATTLE RAISED IN FLUORIDE POLLUTION FOR 30 MONTHS. (*Fukkabutsu ni yoru taiki osen kankyoka ni sanjikkagetsu shiiku shita ushi no bokenrei*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 200. (Nov. 7-9, Paper 155.)

Cattle raised for 30 months in an environment polluted by average of 1 ppb of fluoride and feed containing 40-60 ppm fluorine were slaughtered and dissected. There were no visually detectable anomalies. The blood test conducted immediately before slaughtering showed no anomaly in blood chemistry; liver and kidney functions were also regular. Histopathologically, slight irregularities were recognized in teeth and bones, but the heart, lungs, trachea, brain, liver, kidneys, spleen, glands, and other organs had no abnormalities. The fluorine content in all the organs were normal; high F content was noted in urine, plasma, bones, and teeth. The fluorine content in the skull was 4984 ppm; jaw 5069-5311; vertebrae 4826 to 5629; ribs 3900 to 5163; bones of the lower limb 5142; and teeth 2653 to 4889. The bones of the cattle were in the process of chemical fluorosis or bone fluoridation, or in the process of bone mottling, had not developed into abnormal bone formation.

28052

APTIC NO. 49427

Wettig, K., L. M. Schabad, and A. Ja. Chesina

DETERMINATION OF 3,4-BENZOPYRENE IN PLANT SEEDS BEFORE AND AFTER GERMINATION. (*Bestimmung von 3,4-Benzpyren in Pflanzensamen vor und nach Keimung*). Text in German. *Z. Ges. Hyg. Ihre Grenzgebiete (Berlin)*, 18(12):933-934, 1972. 16 refs.

The determination of the maximum allowable emission concentration is increasingly based on the extent of the various emissions in the human environment. In the case of carcinogenic pollutants, the concentration zero has been recommended by many as the maximum allowable concentration. A good argument against this opinion was the discovery of the natural endogenous synthesis of polycyclic hydrocarbons by plants and microorganisms. In this connection, the natural 3,4-benzopyrene concentration of the following plant seeds was studied: bean, pea, dill, spinach, cress, and lupine. Under the experimental conditions no endogenous synthesis of 3,4-benzopyrene took place at the germination process. A 3,4-benzopyrene formation from the organic substance of the seeds did not take place. The experiments revealed that the seeds produce benzopyrene solely from the nutritive substance. Benzopyrene was also found in plant seeds which had not yet been analyzed by anybody before. To what extent the 3,4-benzopyrene concentration stemmed from sedimented air pollutants or from the soil depended greatly on the air pollution in the area the plant grew. No food plants should be grown in heavily air polluted areas.

28053

APTIC NO. 49107

Yoshinaga, Shunichi, Sadao Iki, Tanetomo Nishimura, Toshiyuki Nagaishi, and Masaru Matsumoto

THE CONTENTS OF HEAVY METALS IN SOIL AND PLANTS. (*Kita-Kyushu ni okeru dojo to shokubutsu no jukinzoku seibun*). Text in Japanese. *Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut.*, 13th, 1972, p. 93. (Nov. 7-9, Paper 48.)

Pollution of soil and plants caused by air pollutants such as soot, dusts, industrial emissions, and automotive exhaust gases was examined. The heavy metal content in the soil and plants of heavily industrial Kita-Kyushu city and those of non-polluted areas of Fukuoka were compared. Soil and plants were liquefied by potassium carbonate and sodium carbonate, and

the manganese, zinc, nickel, cobalt, copper, cadmium, lead, and chromium content was measured by atomic absorption spectrophotometry, and titanium and vanadium content by colorimetry. Generally, plants contained much Mn, Ti, and Zn, and soil contained much Mn, Ti, Cr, and Pb. The metal composition in the soil was very similar to the metal composition found in settling particles. There was a clear correlation between the content of the settling particles and the metal composition of the soil in the same area. However, the degree of absorption of metals by the plants grown in the soil showed no correlation with the settling particle content. The degree of absorption of metals obviously varied among the species.

1971

28054

APTIC NO. 49740

Aronson, Arthur L.

BIOLOGIC EFFECTS OF LEAD IN DOMESTIC ANIMALS. *J. Wash. Acad. Sci.*, 61(2):110-113, June 1971. 21 refs.

Studies and observations on the biologic effects of lead in domestic animals are reviewed. Lead poisoning in cattle usually is the result of a single ingestion of a material containing a large quantity of lead, but it can also result from the long-term ingestion of crops or pasture forage contaminated with lead settling out from fumes and dusts emitted from industrial lead operations and from vehicles. Horses appear to be more susceptible than cattle to the long-term ingestion of lead. Whereas a daily intake of about 2 mg/kg can produce poisoning in horses, a daily intake of approximately 6-7 mg/kg is required to produce poisoning in cattle. The translocation of lead from soil does not contribute more than 15 micrograms/mg dry weight of forage. Thus, amounts of lead in plants in excess of 15 micrograms/mg most likely are due to direct aerial fallout. Although the ingestion of small amounts of lead may not result in clinical signs of lead poisoning, a small fraction of that ingested will be retained in the tissues and contribute to the dietary intake of man. The basic clinical symptoms of lead poisoning, entailing damages of the central nervous system, gastrointestinal tract, and muscular and hemopoietic systems, are depression, anorexia, colic, and anemia. Abortions in ewes ingesting lead-contaminated forage were reported.

28055

APTIC NO. 49643

Fujiwara, Takashi and Haruhiko Ishikawa

EFFECTS OF ATMOSPHERIC SULFUR DIOXIDE ON THE INCIDENCE OF INJURY SYMPTOMS IN VEGETABLE CROPS AND ON THEIR GROWTH.

(*Taiki-chu no SO₂ ga sosai-rui no gaicho hatsugen to seikku ni oyobosu eikyo*). *Noden Kenkyusho shoho* (Agr. Lab. Cent. Res. Inst. Elec. Power Ind.), no. 11:87-96, May 1971. 2 refs. Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., 16p., Dec. 1972.

The effects of atmospheric sulfur dioxide on the incidence of injury symptoms in vegetable crops and on their growth were investigated. Four types of fruit crops (tomato, eggplant, cucumber, and green pepper), two types of root crops (turnip and radish), and four types of leaf crops (Chinese cabbage, cabbage, lettuce, and spinach) were continuously exposed for periods of 14-56 days to gas with a concentration of 0.0-26 ppm of sulfur dioxide. Observed injury symptoms included: grayish-white or brown flecks on the leaves, yellowing of the leaves, and morphological changes in the leaves. The green peppers and the radishes had the greatest resistance to SO₂ of all the vegetables tested; no injury symptoms appeared at 0.26 ppm; and there was no inhibition of their growth. The spinach was the most sensitive, with injury symptoms appearing on the first day. Other crops displayed a medium degree of sensitivity. Inhibition of growth was observed only in turnips, Chinese cabbage, and cabbage. There was no direct effects on flowering and fruiting within the experimental range of gas concentrations.

28056

APTIC NO. 49647

Haertel, O.

ECOPHYSIOLOGY AND ANTHROPOGENIC ENVIRONMENTAL CHANGES.

(*Oekophysiologie und anthropogene Umweltveraenderungen*). *Ber. Deut. Bot. Ges.*, 84(9):497-506, 1971. 34 refs. (Presented at the Botanists Convention, Innsbruck, Austria, Aug. 31, 1971.) Translated from German, 17p.

The effects of human influences on the environment and their results are discussed. Effects on the environment which are becoming more perceptible are the results of two circumstances: concentration in preferred living areas; and the capability of Man to satisfy his civilizing demands in steadily increasing measure, according to his technical capabilities. Encroachments on the environment are direct and indirect: direct through producing the necessary dwelling, cultural, and civic areas; and indirect through waste products, and especially through those of the technological civilization Man has produced. The greater demand for soil, removal of vegetation, the use of fertilizers and insecticides, and the depletion of soil nutrients in relation to unbalancing the original state are considered. Harmful pollutants stemming from industry and the increased use of motor vehicles, including sulfur dioxide and fluorine compounds are reviewed. Photooxidation products such as ozone, the main components of smog, carbon dioxide, and their effects on plants are also reviewed.

28057

APTIC NO. 49646

Halbwachs, Gottfried

PHYSIOLOGICAL PROBLEMS OF VEGETATION DAMAGE BY GASEOUS IMMISSIONS.

(*Physiologische Probleme der Vegetationsschaedigung durch gasfoermige Immissionen*). *Ber. Deut. Bot. Ges.*, 84(9):507-514, 1971. 21 refs. (Presented at the Botanists Convention, Innsbruck, Austria, Aug. 31, 1971.) Translated from German. Leo Kanner Assoc., Redwood City, Calif., 15p., Nov. 1972.

The relationship between fume emissions and the water economy of plants was investigated. Since the apertures are the points of entry of noxious gases, all factors influencing the closing movements of the stomata are important. The condition of openness of the stomata depends on the water economy of the plant, and thus on the environmental factors of water supply, light, temperature, and atmospheric humidity. Tests were conducted -- gasing with sulfur dioxide and hydrochloric acid ranging from subliminal to toxic concentrations -- to determine the reactions of the stomata to noxious gases. Curves were plotted for damaged and undamaged spruce trees studied in the tests. Values for suction stress in different weather conditions are reviewed.

28058

APTIC NO. 49778

Heggstad, H. E. and W. W. Heck

NATURE, EXTENT, AND VARIATION OF PLANT RESPONSE TO AIR POLLUTANTS. *Advan. Agronomy*, vol. 23:111-145, 1971. 154 refs.

Nature, extent, and variations of plant response to air pollutants are reviewed. The most common phytotoxic air pollutants in the USA are ozone, sulfur dioxide, fluorides, peroxy nitrates, ethylene, nitrogen dioxide, pesticides, chlorine, heavy metals, acid aerosols, ammonia, aldehydes, hydrogen chloride, hydrogen sulfide, and particulates, such as cement dust. Ozone and SO₂ are widely distributed. In the USA, ozone seems to be causing more plant damage than any other air pollutant, but on a worldwide basis, SO₂ is more injurious than ozone. Air pollution problems have increased because of multiple sources and mixtures of pollutants. There is increased concern about chronic injury and reduced growth attributed to air pollutants, such as photochemical oxidants and sulfur oxides. Ozone causes small necrotic spots on the upper surface of the leaves, PANs induce undersurface leaf injury in the form of glazing, silvering or bronzing, and SO₂ exerts usually

bifacial and interveinal attack with relatively large collapsed areas surrounding the larger green veins. Fluorides cause injury of leaf tip and margins. The effects of nitrogen dioxide resemble those of SO₂ in acute incident. Response to pollutants may be altered by many factors, such as genetic, environmental, cultural conditions, time-concentration relationships, and the presence of mixtures of pollutants. The identification and use of tolerant varieties, including resistant varieties developed by breeding, will help reduce losses and assure maximum agricultural production.

28059

APTIC NO. 49648

Impens, R.

EFFECTS OF GASEOUS POLLUTANTS ON PLANTS: SULFUR DIOXIDE. (*Effets des Polluants Gazeux sur les Vegetaux: L. Anhydride Sulfureux*). Ann. Gembloix, vol. 77, p. 147-161, 1971. 23 refs. Translated from French. Scientific Translation Service, Inc., Santa Barbara, Calif., 19p.

The effects of gaseous pollutants on vegetation are discussed. Plant injuries, the general result of the physiological and pathological responses of the plant, and plant damage, corresponding to the economic and aesthetic effects of air pollution, are distinguished between in the three categories of disturbances: acute, chronic, and invisible harm. The harmfulness of pollutants appears principally at the cellular level. Changes in anabolism and catabolism, inactivation of enzymes, or alteration of pigments related to pH changes can be noted. As effects accumulate, there is an appreciable decrease in plant growth. Observation and experimental methods used to determine the effect of gaseous pollutants, as sulfur dioxide, consist of four phases: observations of the behavior of plants, including symptomatology, the influence of the plant's age and stage of development on the mode of action of SO₂, specific plant resistance, and microscopic studies of the effects of SO₂; air analysis to determine the precise SO₂ content of air; the measurement of physiological perturbations by chemical, biochemical, and physiological analyses; and the investigation of indicator plants. All four phases are discussed in detail.

28060

APTIC NO. 49649

Klee, R. and A. Wams

EVIDENCE RELIABILITY OF LICHEN EXPLANTS FOR AN INCIDENT OF IMMISSION. (*Aussagewert von Flechtenexplantaten fuer eine Immissionbelastung*). Ber. Deut. Bot. Ges., 84(9):515-522, 1971. 16 refs. Translated from German. Translation Consultants, Ltd., Arlington, Va., 11p.

The reliability of lichen as biological indicators of emissions was investigated. The reaction of *Parmelia physodes* explants to certain emissions under varying climatic conditions was tested. The quality classification of visible damage served as the criterion for lichen damage. Lichen explants were exposed in two series -- fall-winter and spring-summer at various times and in various weather conditions in Frankfurt. Explant boards were photographed at set time intervals to measure plant damage from the weather and SO₂ emissions. The damage of *Parmelia physodes* explants was parallel to the exposure to sulfur dioxide. Lichens were not damaged in the summer, implying that climatic causes are of lesser importance.

28061

APTIC NO. 49810

Masek, Vaclav

NEW DATA ON THE PROPERTIES OF COKERY FLY ASH. (*Neue Erkenntnisse ueber die Eigenschaften des Flugstaubes aus der Kokerei*). Text in German. Wasser Luft Betrieb, 15(11):417-421, 1971. 12 refs.

The effects of three different kinds of cokery fly ash on biological processes and especially on plant growth were studied. The fly ash samples had no influence on the amylase-in-

duced hydrolysis of starch, on the pepsin-induced hydrolysis of albumin, nor on the inversion of saccharose by invertase. The fly ash reduced, however, the photosynthetic activity and the chlorophyll content in young bean plants. Fine particles were most effective due to their good adhesion on the plant surfaces. The rate of growth and the rate of increase in the dry matter in plants grown in a fly ash suspension were practically not influenced by the fly ash. Aqueous fly ash extracts proved to be toxic in white mustard, as judged by the germination index and the root growth. Fly ash, especially fine grains, increased the soil moisture content accessible for the plants.

28062

APTIC NO. 49316

Oelschlaeger, Walter

EMISSIONS AND THEIR EFFECTS ON CATTLE. (*Immissionen und ihre Wirkung auf landwirtschaftliche Nutztiere*). Text in German. Umweltforschung, no. 58:26-29, 1971. (Presented at the Seminar on Environmental Research, Hohenheim University, Stuttgart, West Germany 1971.)

Cattle is mainly affected by two air pollutants, fluorine and lead. The fluorine emissions are largely under control due to regulations. With the number of automobiles increasing, the lead is increasing in the vicinity of highways. Although the lead concentration in fodder grown along highways is considerable, the concentration drops quickly with increasing distance from the highway. Cattle are not so much affected by this pollutant, since they are not fed with fodder of this kind all year round. The concentrations of these pollutants in living animals is still rather low so that there is no danger for humans ingesting the meat from such cattle. Milk could be an exception in this respect provided the animal was acutely exposed to lead.

28063

APTIC NO. 49650

Rabotnova, I. I., V. S. Somov, T. S. Bobkova, I. V. Zlochevskaya, L. N. Chekunova, I. F. Knyazeva, and S. I. Belenkiy

THE RELATIONSHIP BETWEEN THE TOXIC ACTION OF OZONE ON YEAST AND CERTAIN COMPONENTS AND MEDIUM PH. (*O zavisimosti toksicheskogo deystviya ozona na drozhdhi ot nekotorykh komponentov i pH sredy*). Vestn Mosk. Univ., no. 5:47-51, 1971. 1 ref. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 7p.

The relationship between the toxic action of ozone on yeast was investigated. *Candida lipolytica* (sensitive to the action of ozone) and *Candida guilliermondii* (tolerant) yeasts were cultivated in wort for 24 hr at 27°C, separated from the medium by centrifuging, and added (2-5 million cells/ml) to a medium with different reduction properties, achieved by adding a series of ingredients of nutrient media, such as carbohydrates (glucose), hydrocarbons (centane, paraffin), and amino acids (cysteine, glutathione) to the water. Procedures for ozonization and the calculation of ozone concentrations are described. Ozone was obtained from a laboratory ozonizer; ozone in the ozone-air mixture was 0.3 mg/l and 10-12 mg/l, respectively. Experiments were repeated three times, with the oxidation reduction potential (ORP) and the rH₂ values calculated for each test. The influence of the organic components of the medium on the biocidal action of ozone, and the toxic action of ozone in terms of medium pH were reviewed. All results are discussed.

28064

APTIC NO. 49779

Shaw, W. C., W. W. Hech, and H. E. Heggstad

ROLE OF AGRICULTURE IN AIR POLLUTION AND CONTROL. *Options Mediterr.*, no. 9:63-69, Oct. 1971. 12 refs. (Presented at the Agricultural Research Institute, National Academy of Sciences, Annual Meeting, 19th, Arlington, Va., Oct. 13-14, 1970.)

General problems of air pollution-afflicted damages to agriculture are described. The most important toxic air pollutants that originate primarily from nonagricultural sources and that affect agriculture include ozone, sulfur dioxide, peroxyacyl nitrates and other oxidants, ethylene and other hydrocarbons, fluoride, chlorine, hydrogen chloride, nitrogen oxides, heavy metals, particulates, acid aerosols, ammonia, aldehydes, hydrogen sulfide, carbon monoxide, pesticide and other chemical wastes, and radioactive chemicals. Annual damage to agricultural crops and livestock is estimated at more than 0.5 billion dollars, and it is increasing each year. Current agricultural research is concerned with the development of chemical and bioassay techniques to detect the kinds, and measure the quantities of chemical pollutants in the air. Effects of pollutants on plants and animals are being determined. Chemical air pollutants that are being investigated include ozone, sulfur compounds, ethylene, peroxyacyl nitrates, fluorides, nitrogen oxides, chlorine, and automobile exhaust mixtures. Sites of action, mechanisms of action, and the fate of pollutants in plants, animals, and the environment are discussed. Current emphasis is also on research to determine crop yield and quality reductions under field conditions, to understand the influence of climatic, edaphic, and genetic factors as they relate to plant and animal susceptibility, and to develop biological indicators of pollutants. The effects of airborne herbicides, defoliants, desiccants, growth modifiers, nematocides, fungicides, and insecticides on plant growth are also being studied.

28065

APTIC NO. 49704

Shupe, James L. and Arland E. Olson

CLINICAL ASPECTS OF FLUOROSIS IN HORSES. *J. Am. Vet. Med. Assoc.*, 158(2):167-174, Jan. 15, 1971. 12 refs.

Clinical aspects of fluorosis in horses are described. Horses grazing in areas where cattle and sheep had developed severe fluorosis were examined clinically. Major fluorotic lesions occurred only when the horses ingested excessive amounts of fluorine during the period of tooth formation. Dental fluorosis with excessive premolar and molar abrasions, and osteofluorotic lesions, such as porosis, sclerosis, hyperostosis, osteophytosis, and malacia, were observed. Fluorosis was due to the ingestion of vegetation contaminated with airborne particulates and gaseous effluents high in fluorine. Therapy is described.

28066

APTIC NO. 49911

Steubing, Lore

PLANTS AS INDICATORS OF AIR POLLUTION.

Provincia de Buenos Aires (Argentina), Comision de Investigaciones Cientificas, Reunion Probl. Efluentes Ind. Contam. Ambiental, La Plata, Argentina, 1971, p. 27-33. (July 12-17.)

Plants as indicators of air pollution are discussed. With the aid of physical apparatuses and chemical methods the concentration of gases and particulate matter in the atmosphere can be accurately measured. The visible injury symptoms on plants attributable to air pollution are leaves with necrotic spots and final collapse of the tissue, loss of chlorophyll, and growth alterations. Lower plants, mosses, algae, and some lichens were investigated to determine air quality and to identify pollutants in three German cities. Observations were made on lichens appearing on the trunks of roadside and park trees. Chemical analyses were made on the lichens from the natural environment, where five zones of abundance were established (from Zone I -- lichen-free, to Zone V -- normal lichen vegetation), and under controlled conditions in a climate gas-box where the relation of sulfur dioxide to humidity was investigated. The effect of dust on living cells was also studied by the Mnium test, which utilized the moss *Mnium punctatum*. All results are presented.

28067

APTIC NO. 49703

Ter Haar, Gary L.

THE EFFECT OF LEAD ANTIKNOCKS ON THE LEAD CONTENT OF CROPS. *J. Wash. Acad. Sci.*, 61(2):114-120, June 1971. 25 refs.

Studies on the effect of lead antiknocks on the lead content of crops are reviewed. The daily lead uptake by man varies from 100 to 2000 micrograms with an average of 300 micrograms. The lead in food results mostly from lead present in the soil, which has an average of 16 micrograms/g dry weight worldwide. The natural concentration of lead in food resulting from this natural lead content of the soil is a few tenths of a microgram/g wet weight. Lead in the air does not measurably increase the lead content of the edible portion of most plants, while leafy portions of plants such as lettuce, snap beans, soybeans, grass, and radish grown in a narrow band along busy highways contain higher concentrations of lead. However, even in the absence of lead in air, leafy portions contain more lead than do other plant parts. A several-fold increase in lead in the soil does not measurably change the concentration of lead in the plant. Rainwater does not appear to be a significant source of lead in crops. Stresses on the plant, such as senescence, may increase the concentration of lead. All studies to date indicate that the effect of lead antiknocks on lead in the food chain is minimal.

28068

APTIC NO. 49714

Warren, H. V., R. E. Delavault, K. Fletcher, and E. Wilks

A STUDY IN LEAD POLLUTION. *West. Miner*, 1971:1-4, Feb. 1971. 13 refs.

Lead contents in settling dust, soil, fodder, and food crops grown near an intersection of two busy highways in Richmond, British Columbia, were determined. Settling dust collected near the intersection contained up to 42,000 of lead, and lead contents of 1400 to 2250 ppm were found in soil samples within a radius of about 1000 feet of the intersection. Fodder grown within about 1000 yards of the intersection contained lead concentrations of 15 to 5560 ppm dry weight. The lead contents in unwashed vegetables range from 2.9 to 9.2 ppm wet weight. Hence, it would seem prudent to avoid growing vegetables for the public market within the intersection area. However, if the plants are washed and carefully prepared, the amount of lead ingested from the early season vegetables would be comparable with what is ingested from many other areas in Canada.

1970

28069

APTIC NO. 49827

Hademenos, Demetrios George

PRODUCTION OF AIR IONS AND OZONE BY BARLEY TIPS UNDER ELECTRIC FIELDS. *Syracuse Univ., N. Y., Dept. of Physics, Thesis (Ph.D.)*, Ann Arbor, Mich., Univ. Microfilms, Inc., Jan. 1970, 137p. 60 refs.

Laboratory study of air ion and ozone production by barley tips under electric fields is described. Both ozone synthesis and air ion formation can be induced by a barley tip, and any plant tip in general, when exposed to an electric field of sufficient strength as to initiate point discharge. Plants respond physiologically to the ozone and air ions that are formed. The ozone induced inhibiting effects on plant growth; air ions, in particular oxygen ions, enhance growth. The rate of ozone formation was highest for seedlings. The relationship between point tip radii and production of ozone, air ions, and current through the specimen as a function of voltage applied between plant tip and positive upper electrode was also studied.

28070

APTIC NO. 49709

Lanphear, F. O. and Oscar H. Soule

INJURY TO CITY PLANTS FROM INDUSTRIAL EMISSIONS OF HERBICIDES. *HortScience*, 5(4):215-217, Aug. 1970. 2 refs.

Injury typical of the phenoxyacetic acid herbicides 2,4-D and 2,4,5-T was observed in a large area of St. Louis, Missouri, in the spring of 1969. Screening of chemicals from a local manufacturer of these herbicides first on *Forsythia intermedia*, and then on *Ailanthus altissima* and *Cercis canadensis* revealed that at least seven chemicals involved in the production of these herbicides produce symptoms similar to those observed in the field, namely the sodium salt of 2,4-D, 2,4-D isobutyl, 2,4-D acid, 2,4-D isocetyl, 2,4,5-G isobutyl, 2,4,5-Tisocetyl, and 2,4,5-T acid. The concentrations required for injury to occur varied between 10 ppm to 1 ppm, with the isobutyl ester of 2,4-D appearing most active. The field survey revealed *Ailanthus* and *Ulmus* as the most sensitive, and *Acer saccharum* and *Syringa* as the most tolerant species.

1969

28071

APTIC NO. 49644

Godzik, Stefan and Zdzislaw Piskornik

THE EFFECT OF AIR POLLUTION ON PLANTS. (*Oddziaływanie zanieczyszczeń powietrza na rośliny*). *Wiad. Bot.*, 13(4):239-248, 1969. 102 refs. Translated from Polish. Leo Kanner Assoc., Redwood City, Calif., 16p., Nov. 1972.

The effect of air pollution on plants is reviewed. Pollutants discussed included sulfur dioxide, hydrogen fluoride, fluorine and its compounds, nitrogen oxides, ozone, chlorine and its compounds, and ammonia. The sources of each of these pollutants, their specific properties, and their effects are listed. Plant damages elicited by air pollutants are divided into acute damage, chronic damage, and invisible damage. Changes occurring during plant injury are described.

28072

APTIC NO. 49645

Haedicke, Erika

ON PRESELECTION OF LARCHES FOR RELATIVE FUME HARDINESS BY MEANS OF A MORPHOLOGICAL CHARACTERISTIC. (*Zur Vorselektion auf relative Rauchhaerte bei Laerche mit Hilfe eines morphologischen Merkmals*). *Nachrbl. Deut. Pflanzenschutzdienst (Berlin)*, 23(8):173-174, 1969. 7 refs. Translated from German. Leo Kanner Assoc., Redwood City, Calif., 5p., Nov. 1972.

In order to cultivate species of conifers that would be more resistant to damage by fumes from industrial waste gases, a speed test on cut branches of European and Japanese larches was developed in Graupa. Branches with curled needles were more hardy with regard to fume effects than branches with straight needles, both for ungrafted and grafted plants. Two illustrations show the appearance of the characteristic needles. Mean damage percentages were compiled in a table, thus offering an external characteristic for a preselection of more fume resistant trees of the above mentioned species.

1968

28073

APTIC NO. 49710

Gardner, A. Ward and P. K. Hall-Patch

MOLYBDENOSIS IN CATTLE GRAZING DOWNWIND FROM AN OIL REFINERY UNIT. *Vet. Rec.*, 82(3), 2p., Jan. 20, 1968. 1 ref.

An outbreak of molybdenosis in cattle grazing downwind from an oil refinery unit using a molybdenum-containing catalyst was followed by a series of tests and treatments. The refinery was closed down, thus effectively removing all danger of

further contamination. The cattle were treated with copper, and they recovered. Subsequent to the incident, the animals were kept under observation, and the Mo concentrations in the herbage were monitored. The initial high concentrations decreased with time to the range of other pastures not affected by Mo emissions, and there was no Mo accumulation in the soil.

1966

28074

APTIC NO. 49636

Klemm, W.

CONTRIBUTION CONCERNING THE RELATIONSHIP BETWEEN WATER BALANCE AND FUME DAMAGE TO PINES. *Biol. Zentral.*, 85(6):781-783, 1966. 10 refs. Translated from German. McGregor and Werner, Inc., Washington, D. C., Mundas Systems, 4p.

The relationship between water balance and fume damage to pines is reviewed. Various studies have indicated that, under circumstances which favor carbon dioxide assimilation (high light intensity, good water supply), the sensitivity of plants to sulfur dioxide, i.e., smog, increases. Tests were undertaken to examine the water supply of damaged trees by a screening method with which the water supply of the tree was measured in relative units by determining gamma ray reduction. The experimental method is described, and water content and radiation decrease charts are presented. Tests indicated that water deficits in damaged trees were greater than in healthy trees.

28075

APTIC NO. 49828

Landau, Emanuel

THE PUBLIC CONTROL OF AIR POLLUTION: A CASE STUDY IN AGRICULTURE. *American Univ., Washington, D. C., Thesis (Ph.D.)*, Ann Arbor, Mich., Univ. Microfilms, Inc., June 1966, 325p. 223 refs.

Air pollution-induced agricultural damages in the USA are surveyed. Damages to crops and livestock are estimated currently at \$500,000,000 at prices paid the farmer. However, the basis for these estimates are vague and ill-defined, existing only for selected areas of the USA and for damage to specific crops. Hence, the overall extrapolation is based upon limited data. Pollution by sulfur dioxide, in particular, constitutes at least 1/3 of the damage done to agriculture by air pollution. Air pollution-induced agricultural damages can be best estimated for small areas on the basis of objective yield surveys which currently are limited to corn, soybeans, and cotton. The first two crops are not substantially damaged according to our present knowledge of phytotoxicants. Statewide air pollution crop surveys as initiated by the University of California at Riverside are another means of assessing agricultural damages by air pollution. Control programs to reduce agricultural damage are mentioned.

1962

28076

APTIC NO. 49783

Gardner, A. Ward and P. K. Hall-Patch

AN OUTBREAK OF INDUSTRIAL MOLYBDENOSIS.

Vet. Rec., 74(4):113-116, Jan. 1962. 10 refs.

Some 40 tons of catalysts containing 8.2% of molybdenum trioxide were emitted during the start-up of a major unit of Esso Refinery at Fawley, from April 16th to 18th, 1960, due to malfunctioning of the equipment installed for recovery of catalyst from flue gases. The first cattle to be affected became ill 5 days later, and subsequently cattle were affected until the 27th. Ingestion of molybdenum by cattle grazing downwind of the oil refinery was the cause of the illness. The disease had enteric and locomotor manifestations, usually with predominance of either symptom. Acute diarrhea with an irregular relapsing course lasting usually 3 to 4 days, very

marked stiffness of the legs and back especially in young animals, and generally no loss of appetite were determined. Locomotor symptoms persisted for up to 18 days in the worst case, but the majority were affected for only about 14 days. The molybdenum and copper content in the blood were in the respective ranges of 0.012-0.047 mg/100 ml and 0.037-0.139 mg/100 ml. The molybdenum and copper content in herbage samples collected early May 1960 were 0.5 to 85.5 ppm and 1.3 to 20.0 ppm dry weight of sample. Administration of copper, orally or by injection, prevented molybdenosis.

28077

APTIC NO. 49786

Menser, Harry A., Jr.

THE EFFECTS OF OZONE AND CONTROLLED-ENVIRONMENT FACTORS ON FOUR VARIETIES OF TOBACCO, *NICOTIANA TABACUM* L. Maryland Univ., College Park Dept. of Agronomy, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1962, 145p. 93 refs.

Effects of ozone and controlled-environment factors such as light, temperature, and relative humidity on greenhouse-grown tobacco plants were studied. The threshold ozone injury for 2-hour fumigations was between 0.10 and 0.22 ppm. Injury thresholds for the cigar wrapper varieties Bel-W3, AST-C, and 56-92B were respectively 0.10, 0.16, and 0.22 ppm. Catterton variety and showed equal resistance to ozone. Correlation was found between ozone sensitivity and physiological maturity of leaves. Young, rapidly expanding leaves were damaged only at the tips while on recently-matured leaves entire laminar surfaces were highly ozone-sensitive. Three-, four-, and five-hour exposures to ozone at 0.08 ppm caused light to moderate injury to Bel-W3 and AST-C but caused no suppression of growth. Growth was significantly less following repeated fumigations at ozone levels of 0.15 to 0.20 ppm. The route of ozone entry was through stomata of the lower surface. Preconditioning plants to a 22-hour light photoperiod resulted in nearly complete ozone protection of all varieties except Bel-W3. All varieties were severely damaged when preconditioned in the dark for 12 to 70 hour periods. Tobacco plants were also damaged when fumigated in the dark, but the amount of damage was less than what was produced during control fumigations under lights. Ozone damage to plants grown for 2 weeks at a 10 F average temperature differential was significantly less with the cooler temperatures. The combined effects of temperature and relative humidity during fumigation showed severe damage at 60 F and 95% relative humidity and little damage at 90 F and 50% relative humidity. Significant increase in ozone sensitivity above 70% relative humidity and maximum sensitivity at 80% relative humidity were observed. Weather fleck damage to the four test varieties was of the same differential relation as damage caused by ozone.

196E

28078

APTIC NO. 49653

Koval, E. Z.

FUNGUS DISEASES OF TREES AND SHRUBS IN THE CITIES OF THE MARITIME PROVINCE. (*Gribnyye bolezni drevesnykh i kustarnikovykh porod v gorodakh primor'ya*). Byull. Gl. Bot. Sada, no. 37:85-92, 1960. 8 refs. Translated from Russian. Leo Kanner Assoc., Redwood City, Calif., 18p., Dec. 1972.

Fungus diseases of trees and shrubs in the industrial and port cities of the Maritime Province of the Soviet Union were investigated. About 250 species of fungi were found on 60 species of trees and shrubs, the majority of them agents of various leaf, branch, and trunk diseases. A list of trees and shrubs and their diseases is given, and the effects of leaf rust and mildew on these trees is described. Suggested measures to control fungi include pruning and burning of dried and drying shoots in the springtime and fall; protection of the trees from mechanical damage; spraying with a 3% solution of green

vitriol or Bordeaux mixture before the buds swell; covering of wounds on branches and trunks and removal of old branches; grafting pitch, coal tar with creosote, asphalt, carbolineum, and other things used for coating; proper planting of the trees; and the timely carrying out of preventive measures.

28079

APTIC NO. 49867

Lampadius, F.

PREVENTION OF SMOKE DAMAGE IN THE FOREST BY FOREST MEASURES (BASED ON THE EXAMPLE OF THE SMOKE DAMAGE AREA OF ST. EGIDIEN AT THE FOOT OF THE ERZ MOUNTAINS). (*Vorbeugung gegen Rauschschaden im Walde durch forstliche Massnahmen (dargestellt am Beispiel des Rauchschadengebietes St. Egidien am Fusse des Erzgebirges)*. Forst Holzwirtschaft, no. 13:255-259, July 1, 1960. 3 refs. (Presented at the International Work Session of Experts in the Field of Smoke Damage to Forests, Bochum, West Germany, Oct. 6, 1959.) Translated from German, 23p.

The establishment of a foundry at the northern edge of the Erz Mountains basin portends an increased smoke damage threat for a forest region northeast of the foundry site. Sulfur dioxide emissions from the foundry will be 34.1 tons/day if West Elbe coal is used or 16.8 tons/day if East Elbe coal is used. A forest transformation project designed to avert a smoke damage crisis is based on planting approximately 515 hectares of forest with smoke-resistant trees in four 10-year periods (1958-1997). Smoke-resistant species were determined in an investigation that included visual observation of present smoke damage to individual stands and atmospheric sulfur and dust measurements using Liesegang bell jars. Depending on distance from smoke sources, terrain formation, and weather phenomena, sulfur values ranged from 4.04-80.65 mg/100 hr. In forest areas midway between existing SO₂ sources and the foundry site, Liesegang filter sulfur values were 20-25 mg/100 hr. Dust measurements in front of and behind the foundry were 11,000-92,000 particles/l. Extensive smoke damage to particularly sensitive trees (e.g., fir and spruce) was observed in sections where air masses from the principle wind direction came into collision with forest ridges or stand ridges. Smoke damage was also apparent in forest areas where the terrain rose in a northeasterly or easterly direction. The most resistant trees were larch Weymouth, pine, and black pine. Parent stands of these coniferous trees which meet the requirements of seed production are located near the transformation area. Deciduous trees suitable for the transformation project are principally mountain oak, common oak, red oak, and beech; from time to time these will be supplemented by alder, linden, maple, hornbeam, ash, poplar, and birch. The first phase of the transformation will cover the collision areas and those forest surfaces which, due to their terrain, are especially exposed to the smoke effect.

EFFECTS-MATERIALS

1973

28080

APTIC NO. 49815

Beloin, Norman J. and Fred H. Haynie

SOILING OF BUILDING MATERIALS. Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 21p., Jan. 1973. 3 refs.

The rates of soiling were determined for painted cedar siding, concrete block, brick, limestone, asphalt shingles, and window glass exposed to 60-250 micrograms/cu m of suspended particulates at five sites in Birmingham, Alabama. Degrees of soiling were determined by measuring reflectance from the

opaque surfaces and haze through the glass. Excellent dose-response relationships were established for the white surfaces (painted cedar siding and asphalt shingles). The degree of soiling of the paints was directly proportional to the square root of the suspended particulate dose. Shingle soiling was directly proportional to the dose. The regression equations accounted for 74-92% of the variability in reflectance measurements; similar regressions for brick accounted for 34-50% of the variability. Poor correlations were established for concrete, limestone, and window glass. (Author abstract modified)

28081

APTIC NO. 49178

Riederer, Josef

THE INEFFICIENCY OF AIR POLLUTANTS AT STONE DECAY. (*Die Wirkungslosigkeit von Luftverunreinigungen beim Steinerfall*). Text in German. Staub, Reinhaltung Luft, 33(1):15-18, Jan. 1973. 2 refs.

Of all air pollutants present in our atmosphere today, only sulfur dioxide is capable of attacking buildings. Since traffic is the main polluter and the automobile exhausts hardly contain any pollutants which corrode buildings, the widely held belief that air pollution contributes to the decay of buildings must be seriously doubted. In view of the fact that the atmospheric SO₂ concentrations have been decreasing e.g., in Munich from 0.45 mg/cu m in 1955 to 0.15 mg/cu m in 1969, there would be no reason to fear a rapid decay of monuments. The argument that sulfuric acid, which is so corrosive, is formed from flue gases or that lime is converted to gypsum by H₂SO₄, does not explain why limestone shows very low decay of areas directly exposed to H₂SO₄-containing rain, while protected parts are more corroded. It does not explain why massive gypsum-containing soot incrustations are found on intact limestone. And it does not explain the decay of calcite-free sandstone which generally shows the heaviest damage in Germany. Gypsum incrustations are found on bronze surfaces too, which indicates that it was not formed from the underlying material. There is ample reason to argue that the decay of buildings and monuments is due rather to normal weathering.

1972

28082

APTIC NO. 49099

Bertorelle, Eugenio

AIR POLLUTION AND METHODS FOR THE PRESERVATION OF ART OBJECTS. (*La pollution atmosferique et les methodes de protection des oeuvres d'art*). Text in French. Tech. Moderne, 64(10):42-43, Oct. 1972.

Problems of monitoring sulfur dioxide concentrations, and methods for the preservation of art objects are described. An SO₂ monitoring network of 300 stations has been recently put into operation in the Netherlands. The maximum allowable SO₂ concentration adopted in Rotterdam is 0.3 ppm. A similar monitoring service in Milan will give an alarm whenever an SO₂ concentration of 5 ppm is exceeded, while a lower value of 1 ppm applies to stagnant atmospheric conditions. Metallic art objects, exposed to the double action of natural erosion and SO₂-induced accelerated corrosion, should be cleaned by any of the conventional methods such as sand blasting, and then coated with resin under vacuum for the fine penetrating pores to be filled. Electrolytic coating with some corrosion-resistant metal is also possible.

28083

APTIC NO. 49084

Chalk, David L.

NEW STAINLESS RESISTS SCALING. Tool. Prod., 38(9):34-37, Dec. 1972.

Armco's new 18 SR stainless steel contains 0.05 wt% carbon, 1.00 wt% silicon, 18.0 wt% chromium, 2.0 wt% aluminum, 0.40 wt% titanium, and 0.02 wt% nitrogen. This composition was established to produce a cheaper, easier to process scale-re-

sistant ferroalloy. The new alloy is oxidation resistant, welds easily, and has higher tensile strength and better ductility than previous alloys. Oxidation rates after exposure to still air at 2200 F for 100 hr were 448 mg/sq in. for Type 442 steel, 233 mg/sq in. for Type 446, and 31 mg/sq in. for 18 SR. The new alloy can be used in paper mills which produce corrosive sulfur oxide vapors and in thermal afterburners on cars.

28084

APTIC NO. 49591

Dolezel, B.

AGING OF PLASTIC MATERIALS AS AFFECTED BY CLIMATIC FACTORS. (*Vliv klimatických faktorů na stárnutí plastických hmot*). Text in Czech. Koroze Ochr. Mater., 16(2):25-27, 1972. 7 refs.

Effects of the aging of plastics exposed to the atmosphere comprise change in color, crack formation, loss of sheen, and deterioration of mechanical and electric properties. Sun rays, especially their ultraviolet (UV) spectrum, cause fission of some polymer linkages which is proportional to the intensity and duration of UV radiation. Atmospheric oxygen oxidizes polymers with the deterioration dependent on temperature and type of polymer. The least oxygen-resistant are polymers with double linkages and a tertiary carbon atom. Ozone acts similarly except that it acts faster and without an induction period. Temperature changes also affect aging through volatilization of stabilizers and softeners contained in the plastics. Water erodes some plastic additives, some polymers swell through absorption of water. Atmospheric sulfur dioxide present in usual concentrations degrades polyamide as readily as UV radiation. Also, SO₂ and nitrogen oxides play a role in the photodegradation of some polymers. The combined simultaneous effect of oxygen and sunlight is stronger than their separate effects. High humidity accelerates the aging of plastics inordinately, especially in a hot climate. Aging tests reported by manufacturers must be accepted with reservations because they are often performed without simultaneous exposure of the test pieces to mechanical stresses to which materials are subjected under normal use conditions.

28085

APTIC NO. 49495

Duffau, F. and J. G. Faugere

STONE DETERIORATIONS OCCURRING IN THE PROTECTED AREA OF BORDEAUX. (*Les dégradations des pierres dans le secteur sauvegarde de Bordeaux*). Text in French. Pollut. Atmos. (Paris), no. 56:353-362, Oct.-Dec. 1972. 10 refs.

Possible causes of building stone deterioration observed in the protected area of Bordeaux were investigated. Considerable proliferation on stone surfaces of microorganisms, a process enhanced by high humidity and the abundance of nutrients, as well as the presence in the atmosphere of oxides of nitrogen, of carbon, and especially of sulfur along with moisture and fog, were determined as chiefly responsible for the intense deterioration of stone surfaces. Sulfur dioxide, forming sulfuric acid in the presence of humidity, is one of the most aggressive agents attacking stones. Abrasion due to deposition of particulate matter, such as dust, fly ash, compounds of lead, iron, and cadmium as generated by traffic, is another factor promoting stone deterioration.

28086

APTIC NO. 49135

Ishikawa, Tatsuo and Katsuya Inouye

THE STRUCTURAL TRANSFORMATION OF FERRIC OXYHYDROXIDES AND THEIR ACTIVITY TO SULFUR DIOXIDE. Bull. Chem. Soc. Japan (Tokyo), 45(8):2350-2354, 1972. 15 refs.

Sulfur dioxide in the atmosphere and in stack gases accelerates the corrosion of iron. Various oxides and oxyhydroxides of iron, composing the corrosion products of iron, play important roles in the corrosion process and consequently determine the physical and chemical properties of corroded

metal surfaces. The mechanism of the acceleration of corrosion was studied experimentally by studying the interaction of SO₂ with those oxidized compounds. Alpha, beta, and gamma ferric oxyhydroxide were calcined at various temperatures up to 500 C and examined by determining adsorption isotherms in order to relate the reactivity to SO₂ with the structural transformation. For each ferric oxyhydroxide, the amount of chemisorbed SO₂ per unit surface area (Ac), a measure of reactivity to SO₂, decreased with the progress of transformation into alpha-ferric oxide. At calcination temperatures below 200 C, the Ac value of beta-FeOOH was larger than that of alpha-FeOOH or gamma-FeOOH. Thermogravimetric analysis showed that the weight loss of beta-FeOOH caused by heating was larger than the theoretical value corresponding to the dehydration of hydroxyl groups. Changes in the X-ray diffraction patterns and chlorine content of beta-FeOOH with calcination indicated that beta-FeOOH was transformed into alpha-Fe₂O₃ with elimination of inherently contained Cl at a higher temperature than other oxyhydroxides. The high reactivity to SO₂ and large weight loss of beta-FeOOH caused by heating are discussed with respect to the particular structure of beta-FeOOH containing Cl and molecular water, in addition to hydroxyl groups. (Author abstract modified)

28087

APTIC NO. 49199

Kirsch, H. and R. Moeller

SULFUR DIOXIDE EMISSIONS AND THEIR DESTRUCTION OF MARBLE BUILDINGS. (*Schwefeldioxid-Emissionen und deren Schädigung auf ein Bauwerk aus Kalkstein*). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(12):915-917, 1972. 7 refs.

A church in Muehlhausen built in the 14th century showed damage to the wall and sculptures on the south side only while the other walls remained undamaged. Through emission measurements of sulfur dioxide, the source should be determined as well, as the emission concentrations. The measurements were taken at two points, one at the southern entrance into the church and the other on a balcony facing south. The next emission source was 70 m away. It emitted its waste gases just at the height of the balcony. The measurements were taken weekly for a period of one year. The average value of the measurement series at the entrance was 0.35 mg/cu m, on the balcony 0.52 mg/cu m. Studies of the crusts of the sculptures yielded a calcium sulfate fraction of 65.47%. Thus the crust consisted two thirds of gypsum which was formed from the limestone under the influence of SO₂. The crusts of the walls had a calcium sulfate concentration of 17.03%.

28088

APTIC NO. 49322

Komeji, Tetsundo, Yu Fukushima, Tatsukichi Ishiguro, Toshio Ohira, Yoichi Yamamoto, and Morio Kado

STUDY ON METAL CORROSION BY AIR POLLUTION. (*Taikiosen ni yoru kinzokufushoku no kenkyu*). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 3:77-84, March 1972. 14 refs.

Sample pieces of steel, stainless steel, aluminum, copper, and zinc were exposed to air for periods of 1 month, 2-11 months, 1 year, and 2-5 years in an industrial region and a commercial region in order to study their corrosion. The degree of corrosion in relation to the concentration of sulfur dioxide was investigated to find; no definite systematic relationship was found between the two as a whole. However, the corrosion speed is more affected by the concentration of SO₂ in summer months and in those close to summer. The influence of SO₂ on the corrosion becomes less as winter approaches. The 5-month average of SO₂ concentration was 1.58 at Funawatari, 1.02 at Joto, and 0.33 at Eiken. The average corrosion was 1.2/100 mm/mo at Funawatari, 1.10/100 mm/mo at Joto, and 0.74/100 mm/mo at Eiken. Relations between the corrosion and concentration of sea salt particulates were studied. For the sea salt particulates, chloride ions were measured by means of the

thiocyanate mercuric method. Higher corrosion was recorded with higher concentration of sea salt for three locations out of the five. The relation of the corrosion to meteorological factors such as temperature, humidity, and rainfall was also studied. Temperature was most influential as far as the corrosion was concerned. Despite greater rainfall recorded in November, the corrosion in the month was less. In this connection, a further study must be made on effect of the wetting length on the corrosion. The relation of the corrosion to other air pollutants was studied to find that there was a parallel relation between the corrosion and total quantity of precipitating dust, suspended dust, and/or nitric oxide.

28089

APTIC NO. 49549

Luiga, P., Reet Liiv, and P. Tammiste

THE USE OF CORROSION STUDIES AT THE DETERMINATION OF ATMOSPHERIC AIR POLLUTION.

(*Korrozionnyye ispytaniya pri otsenke zagryaznennosti atmosfery vozdukh*). Text in Russian. Eesti NSV Tead. Akad. Toim., 21(4):295-299, 1972. 7 refs.

Methodologic and relevancy problems of corrosion studies in the determination of air pollution are described. Detecting localities with polluted atmosphere by the corrosion intensity of steel test panels is possible in an area with uniform meteorological factors. Under the specific meteorological conditions prevailing in the Estonian SSR, this is possible in areas of about 20 to 30 km in diameter. To obtain comparable and relevant data on corrosion rates, and hence for pollution, the test panels must be fastened at equal heights above ground, not too close to heat-radiating buildings and other sources of heat, and must be oriented in the same direction. The weight-loss method proved to be useful for determination of the amount of metallic corrosion. The corroded panels are descaled by mechanic cleaning and treatment with concentrated hydrochloric acid with a rhodamine inhibitor, or with an ammonium citrate solution. Provided sets of test panels are arranged in a uniform pattern to be exposed to comparable meteorological and pollution conditions; close correlations between the rate of corrosion and the concentrations of sulfur dioxide, hydrogen sulfide, acid mists, or halogens in the atmosphere are obtained. While the correlation between the rate of corrosion and the atmospheric SO₂ concentration is fairly linear, corrosion rate-concentration relations for other, usually low-concentration pollutants are modified by the prevalence of SO₂ or other corrosive agents.

28090

APTIC NO. 49189

Riederer, J.

CORROSION DAMAGE OF BRONZE SCULPTURES.

(*Korrosionsschaeden an Bronzeplastiken*). Text in German. Werkstoffe Korrosion, 23(12):1097-1100, 1972.

The effect of industrial and urban atmospheres on bronze sculptures was studied by determining the composition of the base metal and of the corrosion products. In addition to the corrosion products typical of bronze (basic copper sulfate, copper nitrate, copper chloride, stannous acid, and lead sulfate), other compounds such as gypsum were found which are formed by the reaction between dust and the atmospheric contaminants. The corrosion layers usually included several strata: soot-containing strata were characteristic of the winter. Oils, waxes, and plastic coatings are suitable agents for protecting bronze sculptures against corrosion. The first two materials are suitable in particular for older bronzes having a natural or artificial patina; they require, however, renewal after regular intervals. Plastic coatings are suitable for application to bright metal surfaces and are more durable. Despite the high manpower requirement, it is advisable to regularly clean the sculptures with detergents containing water.

28091

APTIC NO. 49540

Yefimov, I. A., B. N. Rybakov, G. V. Maslova, and Yu. Ya. Kharitonov

PHASE COMPOSITION AND THERMAL STABILITY OF PRODUCTS OF ATMOSPHERIC CORROSION OF LEAD. (*Issledovaniye fazovogo sostava i termicheskoy tsabil nosti produktov atmosfery korrozii svintsa*). Text in Russian. *Zashch. Metall.* (Moscow), 8(6):711-712, 1972. 8 refs.

Samples of continuously cast lead were exposed to sulfur dioxide-polluted atmospheres over 2 years in three different sites, and the phase composition and thermal stability of the atmospheric corrosion products were subsequently determined by X-ray, infrared spectroscopy, and thermography. The precipitation durations at the three sites were 1700, 1250, and 2000 hr/yr. The SO₂ concentrations in the first and second sites averaged 0.25 and 0.13 mg/cu m, while the atmosphere in the third site contained only traces of SO₂. The corrosion products in the first and second exposure sites were composed of basic lead carbonate, hydrocerussite, basic lead sulfate, and lead oxide; those from the third site contained hydrocerussite and lead oxide. The basic lead sulfate content in the corrosion products from the first and second sites increased with atmospheric SO₂ concentration. The quantitative ratio of the isomorphous basic lead carbonate and hydrocerussite was determined by the rate of protonation of the hydroxyl complexes, which were dependent on the electrolyte pH, and hence on the atmospheric SO₂ content.

28092

APTIC NO. 49225

Zeplichal, Franz

AUTOMATIC MEASUREMENT OF ELASTOMER RESISTANCE TO OZONE UNDER STATIC AND DYNAMIC ELONGATION CONDITIONS. (*Mesure automatique de la resistance a l ozone des elastomeres, sous etirement statique ou dynamique*). Text in French. *Rev. Gen. Caout. Plast.*, 49(11):1047-1049, Nov. 1972. (Presented at the French Association of Rubber and Plastic Engineers, International Conference on Caoutchouc, Paris, France, 1970.)

Devices for the automatic measurement of the elastomer resistance to ozone under dynamic and static conditions are described. The De Mattia apparatus, suitable for ozone resistance tests under dynamic conditions according to the specification in DIN 53,522, subjects the specimen to be tested to elongations and flexions at a rate of 300/min, with the specimen being exposed to an atmospheric containing ozone. The time required for fissures to form is recorded. The specimen, with dimensions of 150 by 25 by 2 mm, requires special preparation for the essay. Another automatic apparatus which is designed for static tests of finished articles and which incorporates Schmalz's optic system, performs static bilateral elongation of the specimen, and counts fissures formed in an ozone-containing atmosphere. Reading is directly in microns, and photography is possible.

1971

28093

APTIC NO. 49067

Lewis, P. M.

PROTECTING NATURAL RUBBER AGAINST OZONE CRACKING. (*Protezione della gomma naturale contro le screpolature dovute all ozono*). Text in Italian. *Ind. Gomma*, 16(8):38-42, 45-48, Aug. 1971.

Critical deformation and propagation velocity of cracks are of fundamental importance in assessing deterioration of natural rubber due to ozone. Critical deformation is 120 erg/sq cm, irrespective of ozone concentration and vulcanization system. Protection against cracking can be achieved in articles kept under static deformation by the addition of paraffin and of microcrystalline waxes. An antiozonant wax constitutes an ef-

ficient barrier against attack by ozone for the life of the article. Rubber exposed to dynamic deformation must be protected by chemical antiozonants like N,N-dialkyl-p-phenylenediamine and others which effectively reduce the velocity of crack formation. The quantity of a chemical antiozonant can be considerably reduced by the addition of a small quantity of wax. The protection mechanism is not yet fully understood, but film formation and controlled diffusion are involved. In uses where discoloration is unacceptable, a degree of protection can be conferred by substituting part of the natural rubber with resistant synthetics like polychloropropene. Also, 10-20% synthetic rubber plus 2% of a chemical antioxidant in some cases gives excellent protection against cracking. Protection of chemical antiozonants and of waxes is selective, sometimes cracking is due to mechanical-oxidative fatigue, to sunlight, or to thermal aging, or a combination of these factors. In contrast to waxes, chemical antiozonants are very sensitive to ozone concentrations; in high ozone areas up to 4% of a chemical antiozonant may be required. The presence of carbon black protects rubber against ultraviolet radiation and inhibits photooxidation even in the absence of an antioxidant.

EFFECTS-ECONOMIC

1972

28094

APTIC NO. 49858

Japan Development Bank, Dept. of Investigation

REPORT ON INVESTIGATION OF FACILITIES INVESTMENT PLANS, 1971 AND 1972. (*Showa 46-47 nendo setsubi toshi keikaku chosa hokokusho*). Text in Japanese. 169p., April 1972.

The 1971 and 1972 investments made for public nuisance control facilities showed an increase of 73% between 1970 and 1971, and a 33% increase between 1971 and 1972. Total spending in 1971 was approximately \$937 million and in 1972 was approximately \$1243 million. These investments were 6% of the total industrial investments in 1971, 4.1% in 1970, and 8.5% in 1972. Those industries that spent more than 10% for pollution control in 1972 were petroleum refining (22%), chemicals and paper and pulp (12% each), and non-ferrous metals (10%). Air pollution control facilities showed the largest share (61% for 1972), followed by anti-water pollution facilities (30%) followed by 9% for anti-solid waste, noise, and other forms of public nuisance. Those industries that spent large shares for anti-air pollution facilities were the electric power industries (93%), petroleum refining (81%), mining (93%), and paper and pulp (75%). Geographically speaking, the three coastal industrial areas (Tokyo-Yokohama-Chiba, Nagoya-Yokkaichi vicinity, and Osaka-Kobe area) showed 56% of the total pollution control facilities investments.

28095

APTIC NO. 49862

Tennessee Valley Authority

ENVIRONMENTAL PROGRAM COST IS OVER \$1,000,000 A WEEK. *TVA News*, no. 4516:1-3, Oct. 4, 1972.

The cost of the Tennessee Valley Authority environmental protection programs is expected to average more than a million dollars per week during the current fiscal year, with double that amount projected for next year. Most of the cost involves power funds and must be paid directly or ultimately out of customers electric bills. Current TVA environmental programs include installing electrostatic precipitators at coal-burning power plants; research on sulfur dioxide emission controls; evaluating low-sulfur coal usage; cooling tower systems for nuclear power plants; and general environmental improvements.

28096

APTIC NO. 49308

Bormann, F. H.

URGENTLY NEEDED: A NATIONWIDE APPRAISAL OF THE GROWTH PROBLEM. *Environ. Affairs*, 2(2):271-279, Fall 1972.

The growth of populations and technologies as fostered by national policies of economic growth, the lack of effective policies to control population growth, and the lack of effective concern over the broader aspects of the quality of life are generating enormous pressures on the global environment. Social and ecological symptoms of progressive environmental deterioration are apparent in almost every country: air and water pollution, chemical pollution of food chains, decay of cities, chronic food shortages, increasing drug abuse, and rising rates of juvenile delinquency, crime, and suicide. Since the environmental crisis involves social factors as well as physical and biological factors, ecologists must join in actions to effect fundamental changes in the economy and to reorder the psychic and ecological environment. A series of survival congresses composed of specialists and laymen from all disciplines is proposed to explore alternatives to unrestrained economic growth. Each congress would choose its own area of analysis such as the biosphere, transportation, economics, and national, regional, or city planning. The congresses would then examine the potential effects of continued growth, restricted growth, or no growth. They would design pathways by which a decent environment and other goals could be achieved without apocalyptic social disruption.

28097

APTIC NO. 49086

Dane, C. W.

THE HIDDEN ENVIRONMENTAL COSTS OF ALTERNATIVE MATERIALS AVAILABLE FOR CONSTRUCTION. *J. Forestry*, 70(12):734-736, Dec. 1972. 5 refs.

Assessment of the environmental impact of aluminum, concrete, steel, and wood construction materials using the materials balance and social cost approaches results in different relative rankings of intensity of environmental impact. The social cost approach allows engineering cost estimates to incorporate the environmental impacts of producing alternative construction materials. For new solid materials processed to produce 1 ton of output in 1970, 6,003 tons of direct raw materials and 15,233 tons of direct raw materials plus material requirements for major inputs are needed for aluminum output, 1.00 and 1.00 tons are needed for concrete, 2.64 and 3.39 tons are needed for lumber, and 2.74 and 9.95 tons are needed for steel output, respectively. The estimated environmental impact social costs for 1970 are \$.079, \$.11, \$.397, \$.321, and \$27.00 for aluminum, concrete block products, concrete ready-mix, lumber, and steel, respectively. The social costs as a percent of the 1970 market price are 28, 48, 24, 2, and 9 for the same products, respectively, which represent the percentage rise in the supply price which would occur if producers were required to bear the cost of their environmental impacts.

28098

APTIC NO. 49417

Dumont, Jean-Jacques and Jean-Martin Folz

COST OF AIR POLLUTION-CAUSED EFFECTS. (*Le coût des effets de la pollution atmosphérique*). Text in French. *Pollut. Atmos. (Paris)*, 14(56):329-352, Oct.-Dec. 1972. 6 refs.

Economic aspects of air pollution including effects on human health, vegetation, animals, and materials are assessed. The costs of the effects of air pollution on human health (with such manifestations as chronic bronchitis; respiratory, cardiovascular, ocular, and gastric diseases; cancer of the respiratory tract; and allergies), involve such items as medical expenses, health insurance benefits, and losses due to absenteeism and premature death. Morbidity and mortality rates established for diseases caused by air pollution are not sufficient for estimating costs and losses due to air pollution-related health im-

pairment. Costs of the effects of air pollution on vegetation imply impairment of the quality and reduction of the quantity of agricultural crops, esthetic degradation of the natural landscape, and soil erosion as a consequence of loss of vegetation. Sizable forest damages due to industrial fluorine and sulfur dioxide emissions have been encountered in several areas in France. Air pollution-related costs also arise in husbandry and bee-keeping, with fluorine as the major pollutant. Air pollution inflicts damages to materials, such as buildings, metal structures including vehicle bodies, and clothing.

28099

APTIC NO. 49330

Geschka, Horst and Liselotte Lichtwer

ESTIMATES OF EXPENDITURE ON ENVIRONMENTAL PROTECTION IN THE FEDERAL REPUBLIC OF GERMANY FOR THE PERIOD 1971 TO 1975. *Battelle Inform. (Frankfurt am Main)*, no. 14:4-6, Aug. 1972.

An estimate of expenditure on environmental protection in West Germany for the period 1971 to 1975 is presented. The capital expenditures and corresponding operating costs for environmental protection will amount to 10 and 2.3 billion dollars, respectively, of which the shares of clean air maintenance will be 1.3 and .14 billion dollars. The capital investments on environmental protection will be highest in the chemical industry with 2.3 billion dollars, while 55% or 5.1 billion dollars of all environmental protection-related capital investment will apply to the public sector. The respective shares of power production, coal and steel industry, and private transport will be, however, fairly modest with 2, .7, and .4 billion dollars, respectively. Investment and operating costs for measuring and monitoring systems (\$1 billion) operating costs of existing environmental protection facilities (\$8.3 billion), and capital replacement expenditure on existing environmental protection facilities (3.2 billion) will bring the total expenditure on environmental protection from 1971 to 1975 to 23.5 billion dollars.

28100

APTIC NO. 49152

Law, Philip M., Jr. and Peter Gottsegen

FINANCING POLLUTION CONTROL EQUIPMENT.

Pub. Util. Fortn., 90(10):31-33, Nov. 9, 1972. 1 ref.

In 1972, electric utilities will invest an estimated \$1.03 billion for air and water pollution control, up 82% from \$565 million in 1971. These expenditures are expected to escalate to \$1.19 billion by 1975. New financing methods will be needed to reduce interest costs and expand the market for securities to meet these expanded pollution abatement costs. One method would combine the issuance of tax-exempt industrial development bonds with leveraged investment tax credit leasing to finance pollution control equipment. The interest rates on industrial development bonds would be lower than rates on customary private sources of long-term funds. The electric utility could be treated as the owner of the facility for federal income tax purposes and be entitled to take depreciation and investment tax credit. The industrial development bonds would have several other advantages such as decreasing the volume of direct debt to be sold in the corporate bond market, improving the utility's capital ratios, and causing no new restrictions on borrowing. Leveraged leasing would result in the transfer of certain tax benefits from the electric utility to a financial institution acting as a third-party owner of the equipment; in exchange, the utility, in effect, would obtain the benefit of reduced interest expense.

STANDARDS AND CRITERIA

1973

28101

APTIC NO. 49522

Osaka Prefectural Government Japan, Environmental Pollution Control Center

ESTABLISHMENT OF AIR QUALITY STANDARDS.

(Kankyo yoryo no settei ni tsuite). Text in Japanese. 61p. March 1973.

The industrial complex on the north bank of Sakaichi contributed 40-60% of the sulfur dioxide in a certain area of Osaka Prefecture. The total contribution of SO_x was 44% in 1970. The average SO_x concentration in Osaka city was 5.056 ppm and that in southern Osaka Prefecture was 1.514 ppm. The average nitrogen oxide concentration in Osaka city was 2.157 ppm and that in northern, eastern, and southern Osaka Prefecture were 0.596, 0.751, and 0.675 ppm, respectively. From the results of an investigation in 1970 and 1971, the goals of average SO_x concentration in Osaka city and in northern, eastern, and southern Osaka Prefecture for the coming year were set at 1.31, 1.68, 1.42, and 1.07 ppm, respectively.

28102

APTIC NO. 49172

Kettner, Helmut

THE QUESTION OF SETTING STANDARDS FOR PHYSICAL-CHEMICAL AIR POLLUTANTS IN ROOMS. (Zur Frage der Normierung physikalisch-chemischer Luftverunreinigungen in Innenraumen). Text in German. *Gesundh.-Ingr.*, 94(2):44-51, 1973. 48 refs.

Indoor air pollution by dust and chemical compounds can come from the atmospheric air, through the use of the room, through the equipment, or heaters. Measurements of indoor pollution have rarely been taken. The few results that are available indicate that a good correlation between indoor pollution and atmospheric pollution exists. In one case 900 micrograms of sulfur dioxide/cu m of air were measured indoors. Because of this good correlation, the atmospheric pollutants SO₂, aerosols, carbon monoxide, hydrocarbons, oxides of nitrogen, lead, and aldehydes are discussed. Their sources are reviewed, and data on their atmospheric concentration are provided in tables. Their toxic effects on man are briefly reviewed. Maximum allowable limit values for pollutants have been introduced in several states. A comparison between limit values in the United States and Russia shows that despite different criteria used for the standards, the long-term values are rather close. In Russia the 24-hour average concentration is used as the long-term value, in the United States the average concentration is measured over 1 year. In the United States the primary standards for SO₂ are 80 micrograms/cu m as the annual average, 365 micrograms/cu m as the 24-hour average (once/yr), 1300 micrograms/cu m as the 3-hour average (once/yr), the secondary standards for SO₂ are 60 micrograms/cu m as the annual average and 260 micrograms/cu m as the 24-hour average (once/yr). In the Soviet Union the SO₂ standards are 50 micrograms/cu m as the 24-hour average and 500 micrograms/cu m at no time. The standards valid in the two countries for NO_x, hydrocarbons, CO, and particulates are listed. The creation of standards for indoor air is recommended.

1972

28103

APTIC NO. 49092

Council for the Living Environment (Japan)

ESTABLISHMENT OF ENVIRONMENTAL STANDARDS FOR PREVENTION OF AIR POLLUTION BY CARBON MONOXIDE. (REPORT). (Issanka tanso ni yoru taiki osen boshi no tame no kankyo kijun no settei ni

tsuite (toshin)). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 7(4):762-763, 1972.

The environmental standard for carbon monoxide is applicable to any area where human beings live, work, and function. The standards to be met continuously throughout the year are as follows: the hourly average of any continuous 8-hour period must be less than 20 ppm, and the hourly average of any continuous 24-hour period should be less than 10 ppm. These standards must always be referred to the newly discovered information concerning CO damage on the human body and measurement techniques, and to the actual conditions and fluctuation patterns of CO; periodical scientific re-evaluation should be given to the standards, and changes should be adopted when necessary. The method of measurement should be the use of a non-dispersion infrared analyzer; but this does not prevent the use of other types of instrument which will produce similar results. A continuous measurement is desirable, and the data should be handled as hourly averages. Both localized and larger area measurements should be taken in order to get an accurate picture of pollution conditions and to establish the most effective control methods. The basic policy for attaining the environmental standards, the importance of automotive exhaust control, the enforcement of emission standards, improvements on operational and maintenance techniques for vehicles, and establishing traffic regulations and monitoring systems are briefly discussed.

28104

APTIC NO. 49231

Japan Environmental Agency

REPORT OF PCB CONTROL COMMITTEE. STUDIES OF EMISSION PERMISSIBLE LIMITS OF PCB FOR COMBUSTION TREATMENT OF PCB AND PRODUCTS CONTAINING PCB. (PCB taisakuinkai (taiki kankai) hokoku. PCB oyobi PCB o ganyu suru mono o shokuyaku shobun suru baai ni okeru PCB haishutsu kyoyo genkai ni kansuru kosatsu). Text in Japanese. p. 62-64, Dec. 5, 1972.

Temporary emission limits of polychlorinated biphenyls (PCB) concentration in the combustion gas of PCB or products containing PCB are given. The PCB concentration in the combustion gas of PCB or products containing PCB must be below 0.25 mg/cu m, or 0.017 ppm/five chlorine atoms if calculated as a gas, and that in the combustion gas of liquid PCB or liquid product containing PCB must be below 0.15 mg/cu m (0.01 ppm). The average PCB concentration in the combustion gas, measured approximately three times in one to two days, must be below 0.15 mg/cu m (0.01 ppm), or 0.1 mg/cu m (0.007 ppm) for liquid PCB and liquid products containing PCB.

28105

APTIC NO. 49282

Ministry of Transportation (Japan), Bureau of Automobiles

INSTRUCTION DATA FOR THE 1973 STANDARDS FOR AUTOMOBILE EMISSION GASES. (PARTIAL REVISION OF SECURITY STANDARDS FOR ROAD VAN AND TRANSPORTATION VEHICLES). (Jidosha haishutsu gasu showa 48-nen kisei setsumei shiryō (doro unso sharyo no hoan kijun ichibu kaisei)). Text in Japanese. 18p., Dec. 1972.

Automobiles lighter than 2.5 tons or with a capacity of less than 10 passengers are termed as light automobiles, and those heavier than 2.5 tons or with a capacity of more than 10 passengers are termed heavy automobiles. Effective April 1, 1973 for new model automobiles, revisions of the emission standards include: The running mode is revised from four-mode cycle to ten-mode cycle. Emission standards for light automobiles using gasoline will be carbon monoxide 26 g/km; hydrocarbon 3.8 g/km; nitrogen oxides 3.0 g/km. Light automobiles using liquefied petroleum gas will have CO 18 g/km; HC 3.2 g/km; NO_x 3.0 g/km standards. Light automobiles with two-cycle engine using gasoline will have standards of CO 26 g/km; HC 22.5 g/km; NO_x 0.5 g/km. Heavy automobiles using gasoline will have CO 1.6%; HC 520 ppm; NO_x 2200 ppm. Heavy automobiles using LPG, will have standards of CO 1.1%; HC 440 ppm; NO_x 2200 ppm.

Council for the Investigation of Total Energy (Japan),
Committee on Fuel Sulfur Control

**THE PROMOTION OF IMMEDIATE MEASURES FOR
LOWERING THE FUEL SULFUR CONTENT (DRAFT).**

(Tomen no teioka taisaku no suishin ni tsuite). Text in Japanese. Preprint, 10p., Dec. 25, 1972.

In 1970, approximately 11.2 million kl of various fuel oils were consumed, and the average sulfur content was 1.90 wt%. The total consumption will be 15.0 million kl in 1973, and the average sulfur content must be below 1.22 wt% in order to meet the present environmental standard which states that at least 99% of the 1-hour value of sulfur dioxide concentration must be below 0.2 ppm. According to the calculation based on the assumed amounts of consumption of various fuel oils, the average sulfur content for low-sulfur heavy oil must be below 0.55 wt% and that for indirectly desulfurized heavy oil and directly desulfurized heavy oil must be below 1.20 wt% and 1.50 wt%, respectively.

Japan Environmental Protection Agency, Bureau of
Atmospheric Safety

**THE ESTABLISHMENT OF AUTOMOTIVE EXHAUST
GAS MAXIMUM PERMISSIBLE EMISSION STAND-
DARD FOR NEW CARS, APPLICABLE TO THE
SAFETY STANDARD OF 1973.** (Showa 48-nendo kara
hoankijun toshite tekiyo sarerubeki shisha ni kakawaru
jidoshha haishutsu gasu no ryo no kyoyo gendo no settei ni
tsuite). Text in Japanese. Preprint, 6p., Dec. 1972.

The 1973 emission standards were established for two categories of automobiles. The first category includes passenger cars, light buses, and light trucks, and the second category includes heavy buses and heavy trucks. The new emission standards are as follows for the four-cycle gasoline engine in the first category: carbon monoxide maximum 26.0 g/km, average 18.4 g/km; hydrocarbon maximum 3.80 g/km, average 2.94 g/km; and nitrogen oxides maximum 3.00 g/km, average 2.18 g/km. Standards for the liquefied petroleum gas car in the first category are: CO maximum 18.0 g/km, average 10.4 g/km; HC maximum 3.20 g/km, average 2.34 g/km; and NOx maximum 3.00 g/km, average 2.19 g/km. Standards for the two-cycle engine in the first category are: CO maximum 26.0 g/km, average 18.3 g/km; HC maximum 22.5 g/km, average 16.6 g/km; and NOx maximum 0.5 g/km, average 0.3 g/km. In the second category, gasoline engine standards are: CO maximum 1.6%, average 1.20%; HC maximum 520 ppm, average 416 ppm; and NOx, maximum 2200 ppm, average 1838 ppm. Standards for the LPG engine are: CO maximum 1.1%; HC maximum 440 ppm; and NOx maximum 2200 ppm.

Hishida, Kazuo, Hisao Nihei, Kenji Ikeda, and Kazuo Morita

**THE METHOD OF EFFICIENCY TEST FOR CATA-
LYTIC CONVERTERS.** (Shokubai-shiki sainensho sochi
no seino shiken hoho ni tsuite). Text in Japanese. Japan
Society of Air Pollution, Proc. Symp. Japan Soc. Air Pol-
lut., 13th, 1972, p. 324. (Nov. 7-9, Paper 271.)

The Tokyo Metropolitan Government is promoting the installation of catalytic converters for the users of automobiles. The standard for the equipment is determined by the reduction capacity of each type of equipment. The test car to be used is a gasoline automobile which has been in use for more than one year, with a mileage of about 5000 km and with the total exhaust of 1.81 l. The exhaust measurements are to be taken at 0 km, 200 km, 6000 km, and 10,000 km, and the driving must be 70% city driving up to each measuring point. The test car must be adjusted to the following conditions at the time of the installation of equipment and after each measurement: carbon monoxide emission, 4.5- 5% at idling; 2.0-3.0% at four-mode driving; the ignition system must be in the standard condition. The evaluation is given on the average of CO measurements

obtained by three test cars, and the reduction rate must be at least 50% and more.

Fri, Robert W.

**STANDARDS OF PERFORMANCE FOR NEW STA-
TIONARY SOURCES. PROPOSED STANDARDS FOR
FIVE CATEGORIES.** Federal Register, 36(159):15704-
15722, Aug. 17, 1971. 31 refs.

A proposal for standards of performance for fossil-fuel fired steam generators, incinerators, portland cement plants, nitric acid plants and sulfuric acid plants, including particulate matter, nitrogen oxide, and sulfur dioxide emission standards, test methods and procedures, as well as emission monitoring procedures, is presented. The SO₂ emission standard proposed for fossil-fuel fired steam generators requires a maximum of 0.8 lbs/1,000,000 Btu as a maximum 2-hour average for liquid, and 1.2 lbs/1,000,000 Btu for solid fuel. The proposed nitrogen oxides emission standards for gaseous liquid, and solid fuels are 0.20 lbs., 0.30 lbs., and 0.70 lbs/1,000,000 Btu as a maximum 2-hour average, and expressed as nitrogen dioxide. The particulate matter emission should not exceed 0.20 lbs./1,000,000 Btu heat input, and the emitted smoke should not be darker than shade designated as No. 1 on the Ringelmann Chart. The particulate matter emission from incinerators should not exceed 0.01 g/standard cu ft. The particulate discharge from portland cement kilns and clinker coolers is limited to 0.30 lbs and 0.10 lbs/ton of feed, respectively. The nitrogen dioxide emission from nitric acid plants should not exceed 3 lbs/ton of acid produced. The proposed SO₂ emission standard for sulfuric acid plants is 4 lbs/ton of acid produced. Methods proposed for the determination of stack gas velocity, volumetric flow rate, carbon dioxide, excess air, dry molecular weight, stack gas moisture content, particulate matter, SO₂, and sulfuric acid mist are described.

Ruckelshaus, William D.

**PART 60 - STANDARDS OF PERFORMANCE FOR NEW
STATIONARY SOURCES.** Federal Register,
36(247):24876-24895, Dec. 23, 1971. 23 refs.

Pursuant to section 111 of the Clean Air Act, standards of performance for steam generators, portland cement plants, incinerators, nitric acid plants, and sulfuric acid plants, including emission limits for one or more of four pollutants (particulate matter, sulfur dioxide, nitrogen oxides, and sulfuric acid mist), as well as requirements for performance testing, stack gas monitoring, record keeping, and procedures for preconstruction review and standard applicability study, have been promulgated. The particulate matter emission is limited to 0.10 lbs/million Btu heat input as a maximum 2-hour average, and the opacity is limited to 20%, except that 40% opacity is permissible for not more than 2 min in any hour. The maximum permissible SO₂ emission from liquid fossil fuel firing facilities is limited to 0.80 lbs/1,000,000 Btu heat input as a 2-hour average, or 1.2 lbs/1,000,000 Btu, heat input, maximum 2-hour average, when solid fossil fuel is burned. The maximum allowable nitrogen oxides emission is set at 0.20 lbs/1,000,000 Btu heat input for gaseous, at 0.30 lbs/1,000,000 Btu for liquid, and at 0.70 lbs/1,000,000 for solid fossil fuels except lignite, expressed throughout as nitrogen dioxide. Methods to be applied for the determination of stack gas velocity and volumetric flow rate, of carbon dioxide, excess air, and dry molecular weight, stack gas moisture content, particulate matter, SO₂, and sulfuric acid mist are described.

LEGAL AND ADMINISTRATIVE

28116

1968

28111

APTIC NO. 49663

Ministry of Health and Welfare (Japan) and Ministry of International Trade and Industry (Japan)

EMISSION STANDARDS FOR DESIGNATED AREAS BASED ON PROVISIONS OF THE AIR POLLUTION PREVENTION LAW. APPENDIX I. p. 1-5, Nov. 30, 1968 (?). Translated from Japanese. McGregor and Werner, Inc., Washington, D. C., Mundus Systems. 8p.

Emission standards for designated areas in Japan are presented. Standards are for sulfur oxides, soot, and other particles. Sources designated in the regulations include boilers, all types of furnaces, catalyst reclamation towers, and refuse incinerators. All designated areas are named.

LEGAL AND ADMINISTRATIVE

1973

28112

APTIC NO. 49159

A SYSTEM OF PRE-EXAMINATION OF CHEMICALS BEFORE COMMERCIALIZATION. I. (*Kagaku busshitsu no jizen shinsa seido donyu o - jou*). Text in Japanese. Tsusansho Koho (Gaz. Minst. Int. Trade Indr.), no. 6945:4-7, Jan. 13, 1973.

The council for Production Techniques of the Light Industry submitted a report to the Minister of International Trade and Industry concerning the Minister's inquiry regarding what the countermeasure for securing the safety of chemical substances should be on Dec. 21, 1972. So many kinds of chemical substances, such as polychlorinated biphenyls and agricultural chemicals, are produced, consumed, and released into the environment now that an establishment of closed systems for not releasing chemical substances which are possibly dangerous to the environment and an enforcement of pre-examinations to check the chemical substance before its commercialization are necessary. There are several points which are not covered by existing laws for this purpose. Chemicals which chronically harm human health but do not show acute toxicity are not under legal regulation. Even when a chemical is named as a toxic substance its usage is, in principle, not regulated. Chemicals which are not registered as foods, food additives, drugs, and agricultural chemicals, and which are mainly used for industrial raw materials are not regulated unless they are named as toxic substances because of their acute toxicities. The law which protects workers in factories does not regulate general environmental conditions outside the factories. From these considerations, the council strongly suggests that pre-examining the safety of such chemicals which the existing laws are not able to regulate is necessary. The examination should consider safety of the chemical itself (chronic toxicity, teratogenicity, carcinogenicity, and degradability in the environment), routes of the chemicals to human beings, and the constituents of the effect of such chemicals.

28113

APTIC NO. 49329

Brushwell, William

COATINGS UPDATE. CHAPTER 3. POLLUTION AND THE PAINT INDUSTRY. *Am. Paint J.* 57(12):56-61, Jan. 22, 1973. 14 refs.

The impact of pollution control regulations on the paint industry is discussed. In March 1972, the Food and Drug Administration issued a regulation which would reduce paint lead levels from 1% to 0.5% by Jan. 1973 and to 0.06% by Jan. 1974. The regulation would apply to paint for interiors and exteriors of residential structures and to toys and other articles for children. The industry has challenged the proposal on the basis of lack of technical capability for achieving proper per-

formance at the 0.06% lead level, and also because insufficient time is being allowed for reformulation. Similar regulations have been enacted at the state or local level throughout the U. S. A Chicago ordinance limits the lead content of paint for interior surfaces, toys, and furniture to 0.06%, the same ordinance restricts the content of antimony, cadmium, mercury, and selenium to 0.05%. A Massachusetts law, effective Jan. 1973, limits the allowable amount of lead in all coatings to 0.5%; New Jersey legislation restricts the lead content of interior paint to 1%; and New York limits the lead content of paints used on pencils to 1%. Pennsylvania, Delaware, and Kentucky are considering legislation. To assist coating formulators to meet government restrictions, the Federation of Societies of Paint Technology established Project Cope. Marine coatings manufacturers have been working on possible mercury replacements for several years, so a regulation eliminating alkyl mercury used in ship coatings is not expected to have serious impact on the paint industry. Los Angeles County Rule 66, which has been effective in limiting emissions of photochemically reactive solvents, will be adopted by many states as a means of implementing the Clean Air Act of 1970. In Los Angeles, there has been a strong trend toward water-based coatings, higher solids coatings, and powder coatings.

28114

APTIC NO. 49378

Murase, A

SULFUR DIOXIDE SOURCE MONITORING SYSTEM IN KAWASAKI. (*Kawasaki-shi no SO2 jido kanshu shisutemu*). Text in Japanese. Netsukanni to Kogai (Heat Management Public Nuisance), 25(2): 33-38, Feb. 1973.

Kawasaki city has seven monitoring stations monitoring 12 items. Data is transmitted to the monitoring center by telemetry. Information concerning sulfur dioxide, fuel consumption, and other factors at 42 major factories is also transmitted to the center. The data is recorded and indicated on graphic panels. Citizens are notified when SO2 emissions are above normal. Heavy oil flowmeters and SO2 stack monitors are installed at the factories. Other monitoring systems measure oxygen, coal, and carbon monoxide at the factories.

28115

APTIC NO. 49071

Oblaender, Kurt and Dieter Kraeft

EXHAUST GAS LEGISLATION, LIMIT VALUES, AND MEASUREMENT METHODS FOR THE AUTOMOBILE SECTOR. (*Abgasgesetzgebung, Grenzwerte und Messverfahren im Kraftfahrzeugwesen*). Text in German. *Motor-techn. Z. (Stuttgart)*, 34(3):84-91, 1973. 10 refs.

The legislation concerning the reduction of pollutants in automobile exhausts is most advanced in California and the United States. Japan was the next country to set limit values, followed by West Germany. In Germany only the lead concentration in exhausts has been limited to date. A review of the operating principle of the Constant Volume Sampler Tests I and II is given. A new method for the measurement of the oxides of nitrogen emission is based on the chemiluminescence principle. Nitric oxide is oxidized with ozone to nitrogen dioxide. About 10% of the NO2 formed is excited briefly giving off a chemiluminescence radiation in the trace range between 500 and 3000 nm with a marked intensity maximum at 1000 to 1500 nm. The NO2 present prior to the analysis must be thermally (at 650 C) separated into NO and oxygen. The Japan test and the United States 13-mode-test and 21-mode-test for diesel engines are briefly reviewed. Auto emission and air quality standards are given for carbon monoxide, NOx, carbon dioxide, oxidants, hydrocarbons, and suspended particulates for California and the U. S.

28116

APTIC NO. 49102

Silvennoinen, Seppo

DEVELOPMENTS IN AIR AND WATER EFFLUENT CONTROL IN FINLAND. *Paper Trade J.* 157(6):26-29, Feb. 5, 1973. 8 refs.

Water and air pollution control programs of the Finnish pulp and paper industry are reviewed. The immediate objective of the water protection program is to implement mechanical primary clarification systems at every mill and thus reduce the discharge of suspended solids to 160,000 tons by 1976. In 1970, half the primary treatment plants were earthen sedimentation basins. Most basins under construction today are concrete and convertible to chemical treatment. Internal measures to decrease waste loads prior to mechanical treatment include recycling, by-product recovery, spills collection, steam or air stripping of condensates, and separation of noncontaminated waters from waste waters. A further reduction of dissolved organic materials will be achieved following implementation of chemical and biological treatment methods in the late 1970s. The air pollution control program of the pulp and paper industry is less advanced than for water. For the removal of particulates from stack gases, electrostatic precipitators and scrubbers are used. In kraft pulping, the stripping of condensates and the burning of malodorous gases are becoming standard practice. In new black liquor plants, the trend is away from direct contact evaporators. The implementation of pollution control programs will largely depend on the availability of long-range financing programs. In Finland, the Water Act of 1962 is enforced by the National Board of Waters. Enactment of air pollution legislation is expected in 1973. Research programs are also discussed.

28117

APTIC NO. 49598

Weber, Klaus

THE TECHNICAL INSPECTION ASSOCIATIONS DEVOTE THEMSELVES TO THE PROTECTION OF THE ENVIRONMENT. THE PRESENT STATE OF THE EFFORTS FOR MAINTAINING A CLEAN AIR. (*Die Technischen Ueberwachungs-Vereine im Dienste des Umweltschutzes Stand der Bemuehungen um die Luftreinhaltung.* Text in German. *Wasser Luft Betrieb*, 17(1):20-23, 1973. 5 refs.

The most important activities of the Technical Inspection Associations in West Germany comprise the evaluation of the adequacy of dust collection systems, evaluation of the stack height of new plants to be authorized, inservice tests, and measurement of the emissions after dust collectors, regular measurements of the emissions by boilers, measurement of gaseous and dust emissions from industrial plants, inspection of state-owned heating systems, large scale emission measurement programs concerning dust and sulfur dioxide, and calibration of measuring instruments. In all of West Germany there are 11 such Technical Inspection Agencies. The first large-scale measurement program was that in and around Cologne. Each emitting stack, each chemical plant, and each chimney of private homes and other sources was covered by the measurements. The traffic density was determined by traffic counts. The automobile emissions were tested on an engine dynamometer. A total of 200 different pollutants were identified over the city. In Nordenham/Unterweser, an extensive measurement program is being staged which is the first in West Germany of this kind. It was triggered by an air pollution episode in the vicinity of a zinc and lead plant. The program comprises the measurement of atmospheric pollutants, a test of the effect of the waste gases on animals, plants, and water, as well as medical examinations of the population.

1972

28118

APTIC NO. 49158

Ministry of International Trade and Industry (Japan)

AN INVESTIGATION OF THE ENVIRONMENTAL PROTECTION OF INDUSTRIAL COMPLEXES. (*Konbinato kankyo hozen chosa ni tsuite*). Text in Japanese. 71p., Sept. 1972.

Investigations were conducted in eight industrial complex areas with a total of 179 major factories. The factories subjected to the investigation were chemical plants, oil refineries,

AIR POLLUTION ABSTRACTS, JUNE 1973

steel manufacturers, and power plants. In the Kawasaki/Yokohama industrial area, there were 1398 patients approved as victims of air pollution and water pollution. The number of patients in other areas was smaller. In the Chiba, Sakai, Izumikita, and Mizushima areas, the degree of pollution decreased to below the environmental standard, in the Kawasaki/Yokohama area little improvement occurred. The pollution control programs at each area are described.

28119

APTIC NO. 49255

Ministry of International Trade and Industry (Japan) Bureau of Coal Mining

THE CONTROL OF AROMATIC HYDROCARBONS AND OTHER POLLUTANTS IN FUEL GASOLINES.

(*Jidosha gasolin-chu no hokozukuei tanka suiso nado no yokusei ni tsuite*). Text in Japanese. 10p., July 1972.

Countermeasure plans for nitrogen oxides, oxidants, and hydrocarbons from automotive exhaust, as well as from fixed sources, are described. Environmental standards for hydrocarbons are expected to be issued in the coming summer, and those for NO_x and oxidants are also to be established soon. With the enforcement of the no-lead gasoline standard, the octane value of regular gasoline and high-octane gasoline should remain at 91 and 98, respectively. Traffic controls are also being established by reinforcing regulations and promoting public transportation.

28120

APTIC NO. 49400

Japan Chamber of Commerce and Industry, Bureau of Industrial Pollution Information

REPORTS ON ACTIVITIES OF THE BUREAU OF INDUSTRIAL POLLUTION INFORMATION. (*Sangyo kagai sodanshitsu jigyo hokokusho*). Text in Japanese. 48p., Aug. 1972.

Six hundred sixty-two cases of public nuisance were studied at this office in Aug. 1972, including 132 cases of air pollution and 18 cases of offensive odors. There were also 91 cases of plant consultations including 13 cases of air pollution and three cases of offensive odors. The air pollution consultations included the treatment of dust from open hearths using venturi scrubber, the treatment of toluene as an air pollutant, collection of dusts by jet scrubber, and regulation of boilers to meet emission standard. The offensive odor consultations included the prevention of odors at automobile coating plants.

28121

APTIC NO. 49478

Environmental Protection Agency, Research Triangle Park, N. C., Applied Technology Div.

GUIDE FOR COMPILING A COMPREHENSIVE EMISSION INVENTORY. Pub-APTID-1135, 196p., June 1972.

NTIS: PB 212231

Detailed procedures are given for obtaining and codifying information about air pollutant emissions from stationary and mobile sources. The system was specifically developed for use by state and local air pollution control agencies. A uniform coding system for the data is encouraged in order that the information from one region may be compared with that from another. Detailed procedures are given concerning the information to be gathered from each source, the methods to be used to gather the information, the codes to be used to simplify the information on standard coding forms, the geographical and population information needed about the area of interest, the apportionment techniques and emission factors needed, and the methods of displaying the data. The relation of state and local emission inventory systems to the Environmental Protection Agency NED system is also explained. Area source coding is given for stationary fuel combustion, solid waste disposal, motor vehicles (gasoline and diesel powered vehicles, vessels, aircraft, and railroads), and evaporative losses. Point source coding is also described. (Author abstract modified)

LEGAL AND ADMINISTRATIVE

28126

28122

APTIC NO. 49793

Atomic Energy Commission, Washington, D. C.
ENVIRONMENTAL STATEMENT. PLUTONIUM
RECOVERY FACILITY. ROCKY FLATS PLANT,
COLORADO. Rept. WASH-1507, 130p., Jan. 1972. 13
refs.

NTIS: PB 198762-F

This final environmental statement was issued to comply with the National Environmental Policy Act in support of the Atomic Energy Commission's proposal for legislative authorization and appropriation covering design and construction of a proposed plutonium recovery facility at Rocky Flats, Colo. The facility will replace an existing facility and will be used to recover plutonium from scrap generated in operations of the plant which fabricates plutonium components for nuclear weapons. No significant radiologic impact on the environment is anticipated from the new facility, since the latest design, construction, and operational criteria and techniques will be utilized. There will be a reduction in the quantity of the waste generated for ultimate disposal. There will be some impact on the use of several acres of existing land for construction. Some additional sanitary wastes will be generated. High efficiency particulate air filters will remove 99.97% of the particulates 0.3 micron in size. Thirty-three environmental monitoring stations are used to sample the air in the vicinity of the present plant. Comments on the draft from various Federal agencies, the Environmental Protection Agency, and the State of Colorado are included. Alternatives to the proposed project were continued use of the existing facility, discontinuance of plutonium recovery operations, and moving plutonium operations or recovery operations to another location. (Author summary modified)

28123

APTIC NO. 49902

California Univ., Los Angeles, Environmental Science and
Engineering

RESEARCH INVESTIGATION. AIR POLLUTION AND
CITY PLANNING. CASE STUDY OF A LOS AN-
GELES DISTRICT PLAN. 278p., 1972. 151 refs.

The air pollution consequences of development in accordance with a newly proposed urban land use plan were studied for the Canoga Park-Winnetka-Woodland Hills District of Los Angeles. Present levels and air quality standards of oxidants, hydrocarbons, carbon monoxide, nitrogen oxides, ozone, particulates, and sulfur dioxide are listed. The study area was evaluated including economy, population, expected growth, projected land use, and zoning. Air pollution chemistry, photochemical reactions, meteorology, motor vehicle emissions, stationary sources, mass transportation, and other factors were considered. Projected motor vehicle emission and air pollution values are given for the San Fernando Valley and the study area. Appendices are given on the effects of air pollution on human health, public attitudes, population and housing statistics, land use, air pollution chemistry, meteorology and modeling, projections of motor vehicle registrations and gasoline use, traffic flow, a statistical method for estimating ambient air pollution levels, and motor vehicle contributions to air pollution. Technology will not solve the air pollution problem; only changing present life styles, at considerable cost and inconvenience to urban residents, will bring about the attainment of air quality objectives. If nothing is done to reduce population growth and automobile use, air pollution will continue to endanger the health of the urban population for many years.

28124

APTIC NO. 49946

Institute of Public Administration, Washington, D. C.;
Teknekron, Inc., Washington, D. C.; and TRW, Inc.,
McLean, Va.

EVALUATING TRANSPORTATION CONTROLS TO
REDUCE MOTOR VEHICLE EMISSIONS IN MAJOR

METROPOLITAN AREAS. AN INTERIM REPORT.
Environmental Protection Agency Contract 68-02-0048,
400p., March 16, 1972. 151 refs.

NTIS: PB 212641

A report evaluating transportation controls to reduce motor vehicle emissions in main metropolitan areas is presented. Transportation controls studied include: inspection, maintenance, and retrofit; gaseous fuel systems; traffic flow techniques; bypassing thru traffic; improvements in public transportation; motor vehicle restraints; and work schedule changes. Each measure is defined and described. An analysis of the air pollution control potential is made of each measure, and the institutional and cost feasibility of each is discussed.

28125

APTIC NO. 49956

Tokyo Metropolitan Environmental Research Inst. (Japan)

OUTLINE OF PLAN TO PROTECT CITIZENS OF
TOKYO FROM ENVIRONMENTAL POLLUTION, 1972.
122p., Nov. 1972.

The Plan to Protect Citizens of Tokyo From Environmental Pollution, 1972, a revision of the plan formulated for 1971, sets forth the countermeasures against the principal types of environmental pollution to be enforced by the Tokyo Metropolitan Government and adjacent municipalities in the next 10 years. The plan is divided into two parts: a short-term plan (1972-1976) to reduce pollution to the level of present environmental standards, and a long-term plan (1977-1982) to attain a pollutant level better than present standards. The short-term plan comprises specific yearly target figures obtainable under existing conditions; the long-term plan has no yearly goal and includes necessary revisions in existing conditions and laws. The countermeasures apply to air pollution, including sulfur oxides, settling soot and dust and suspended particulates, motor vehicle exhaust gases, photochemical smog, offensive odors and poisonous gases, and oxygen-poor air; water pollution, including rivers and streams, Tokyo Bay, and seas around islands; land subsidence; waste disposal; and soil pollution. Each pollution category is discussed with respect to the present situation and outlook, target figures and dates, general approach to countermeasures, and countermeasures. Measures for the protection of public health, the restoration of the natural environment, establishing industrial sites, and resolving pollution damage suits are also outlined. Results of the 1971 plan, including new ordinances, are summarized.

28126

APTIC NO. 49486

Ando, Kichinosuke and Haruo Ukawa

CURRENT STATUS AND FUTURE PROSPECT OF
PUBLIC NUISANCE CONTROL IN EUROPE AND
THE UNITED STATES. (*Obei ni okeru kogi kisoku no
genjo to shorai*). Text in Japanese. *Jidosha Gijutsu* (Au-
tomobile Eng.). 26(9):1051-1058, Sept. 1972.

Although California proposes to set up less severe environmental standards, and requests for delay in beginning Clean Air Act standards have been made by automobile manufacturers, Federal standards will have to be put into force eventually. In Europe, since air pollution in big urban areas does not present serious problems yet, environmental standards are as severe as in the U. S. In Europe, the European Economic Community cycle (15 modes), g/Test method, Total Bag method, and analysis by non-dispersive infrared analysis have been adopted. Carbon monoxide concentration at idling is to be less than 4.5%. There should be less than 0.15% hydrocarbons of total fuel emitted in the crankcase. Nitrogen oxide emission standards have also been formulated. Noise control in Europe is mostly in accordance with the Measurement of Noise Emitted by Vehicles, ISO Recommendation R 362. In the U. S., there is no Federal regulation concerning noise, although there are state regulations such as California's Vehicular Noise Limits, Section 2310 of California Vehicle Code. The Motor Vehicle Noise Standard is becoming more strict. The Department of California Highway Patrol measure-

ment method is followed. Electric waves are disturbed by interference from ignition systems of automobiles. In Europe, the standard of the Comité International Spécial des Radioélectriques (CISPR) is generally adopted, although situation varies from country to country. Countries other than Europe, including the U. S., will be following the same direction.

28127

APTIC NO. 49468

Harrison, John Howard

MANPOWER NEEDS IN ENVIRONMENTAL MANAGEMENT. Ohio State Univ., Columbus, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 212p. 60 refs.

Current and emerging occupations in environmental management are described; the number of persons currently employed and employment opportunities in such occupations are estimated; and tasks performed by persons employed in selected environmental management occupations are specified. Data concerning manpower needs were obtained from administrators of wastewater and water treatment facilities in Ohio, of air pollution control agencies, of the State Department of Health, and of the Environmental Studies Research Project. Projected manpower needs to 1974 anticipate an increase in the number of full-time personnel needed for virtually all positions, and for all positions in wastewater treatment and air pollution control, comprising inspectors, engineers, chemists, technicians, and meteorologists. Tasks and priorities assigned for air pollution control inspectors are advising supervisors of investigation findings; investigating air pollution complaints, obtaining legal evidence by taking photographs and movies; inspecting boilers by testing for sulfur dioxide, nitrogen dioxide, carbon monoxide, and checking safety devices; meeting with suspected violators of the air pollution code; and giving accurate testimony in court proceedings.

28128

APTIC NO. 49249

Hishida, Kazuo, Hisao Nihei, and Kenji Ikeda

AUTOMOTIVE EMISSION CONTROL IN THE TOKYO METROPOLITAN AREA. (Kamitsu toshi ni okeru jidosha haigasu taisaku ni suite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 321. (Nov. 7-9, Paper 268.)

The first step of controlling automotive emission is the determination of emission index by car types as a group. A car type is selected, and the exhaust gas is measured. A unified method of measuring is applied to each type and the emission index per unit (per liter of oil combustion, or per km of driving) is determined. This per unit index is expanded into a group total emission. The total emission quantity is calculated by the sources, pollutant types, districts, and the mesh pollution intensity (1000 sq m or 500 sq m) is obtained. This information can be used as basic material for establishing or revising regulation standards. One quick, efficient method of automotive exhaust control is the zone defense. This is particularly effective in an emergency. Accurate pictures of a particular location, its rush hour condition, car types, and any other factor contributing to pollution and its intensity must be obtained. This information is applied to the simulation calculation handling in order to determine the restriction of the traffic amount, speed, car types, direction, time, and location by computer.

28129

APTIC NO. 49435

Inoue, Tsutomu, Makoto Tani, Koichi Oda, Toshihiko Inoue, and Shoichi Hamada

AIR POLLUTION CONTROL PLAN, OSAKA CITY. NO. 5: CONDITIONS OF AIR POLLUTION FROM VEHICLE EXHAUSTS AND ITS CONTROL, OSAKA CITY.

(Kurin ea puran (Osaka-shi taiki osen boshi keikaku kihon koso), sono go, Osaka shinai shuyo chiten ni okeru jidosha haishutsu gasu osen no jittai to sono teigen keikaku ni suite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 320. (Nov. 7-9, Paper 267.)

AIR POLLUTION ABSTRACTS, JUNE 1973

Carbon monoxide measurements were taken at 148 locations in Osaka; from the results, a pollution index of each location was calculated. The locations where the index exceeded 1.0 required the reduction of emission quantity or the traffic amount. The emission density was calculated from the width of the road, and the ratio of required reduction of traffic amount was obtained. From the total emission quantity of the city, the daily quantity was calculated. The projected emission for the entire city was calculated from the projected figure of the daily traffic increase, and the required reductions for emission and traffic were calculated. Of the 148 locations, three exceeded 20 ppm (average of 5 min), and 35 locations exceeded 10-20 ppm. The standard index of 1.0 was exceeded at about 50% of the total locations. The cut rates required were 86% maximum and 2% minimum. In further studies, the emission rates by driving modes and the mode patterns in the city should be taken into account when calculating the emission index; topographical and geographical elements should be also considered. This was only a linear reduction plan, but a total reduction plan covering the surface is necessary.

28130

APTIC NO. 49585

Inoue, Tsutomu, Makoto Tani, Toshiro Hiraoka, Noboru Mizutani, Kenichi Oida, Kenichiro Nishiyama, Tadaomi Nakai, Nobuaki Hannoda, Hiroyoshi Yoshida, Tojiro Ito, Hiroshi Hashimoto, and Hiroshi Muranaka

THE AIR POLLUTION CONTROL PLAN OF OSAKA CITY. NO. 4. AIR POLLUTION CONTROL IN THE DISTRICTS ALONG THE KIZU-RIVER. (Kurin ea puran (Osaka-shi taiki osen boshi keikaku kihon koso) Sono yon. Kizugawa shugen tokubetsu taisaku ni suite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 160. (Nov. 7-9, Paper 115.)

The areas along the Kizu River toward the coastal area in Osaka are emission sources of sulfur oxides, dusts, and suspended particulates from the complex of heavy chemical industries, steel industry, ceramic industry, and plywood industry. The basic plan for attaining the environmental standards for these areas was designed, and the 54 major factories, 20 plywood plants, and 70 lumber mills of the area were given the enforcement plan. A 45% reduction of sulfur oxide emission is to be attained between 1969 and 1972, and a total reduction of 75% is to be attained by 1975. The average sulfur content in the emission gas should be 1.20% by 1972 (against 1.86% 1969) and 0.55% by 1975. The 1971 average of sulfur oxides in these areas was 0.054 ppm, and of suspended particulates 0.109 mg/cu m. The method of enforcement is as follows: Administrative guidance is given at a meeting; pollution control plans are to be made up and presented; actual conditions are examined and compared with the plans; if the plans pass, they are immediately carried out; if the plans fail to pass, revisions are recommended; the progress is inspected and further improvements are recommended; the plans are completed, and the effects are evaluated.

28131

APTIC NO. 49729

Jutze, George A.

GUIDELINES FOR TECHNICAL SERVICES OF A STATE AIR POLLUTION CONTROL AGENCY. Pedco-Environmental Specialists, Inc., Cincinnati, Ohio, Office of Air Programs Contract 68-02-0211, OAP Pub. APTD-1347, 300p., Nov. 1972. 119 refs.

NTIS: PE 214179

Guideline information is presented to assist the user in detailing the needs and requirements of a state-wide air pollution control technical services system stressing laboratory operations. A number of State, regional, and local agencies were visited; their individual situations and operational programs were compiled into case histories which formed the data used for the guidelines. The role of technical services, their function, various possible organization structures, and their relationship to other agency elements is discussed. The operation

of technical services, division of responsibilities, and management of the technical services group are reviewed. Legal considerations, personnel monitoring, qualifications, contracting consideration, quality control, and data handling systems are reviewed also.

28132

APTIC NO. 49348

Kaji, H.

POLICY FOR VEHICLE TRAFFIC CONTROL IN RESPECT TO ANTI-POLLUTION MEASURES. In: *Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection*. Tokyo Metropolitan Environmental Protection Research Inst. (Japan), p. 62-66, 1972.

An attempt to explore the possibilities of anti-pollution-oriented traffic policy and to develop a comprehensive model for its test is presented. Running time and traffic volume are intertwined in a cause-and-effect relationship. From the pollution viewpoint, any reduction of the running time that brings about an even higher increase of the traffic volume is counter-productive. Instead, both running time and traffic volume should tend toward a minimum. Reduction of the rate of vehicle ownership, reduction of the rate of vehicle use, increase of the efficiency of traffic flow, and reduction of the overall traffic movement are among the basic objectives to be achieved in traffic control from the pollution abatement viewpoint. These objectives can be achieved by a variety of measures such as augmented vehicle acquisition tax, automobile tax, expanded levels of compulsory insurance, increased taxes on gasoline, readjustment of the mass transportation facilities, restraint on parking lot construction, higher tolls for expressways, and change in the manner of land utilization.

28133

APTIC NO. 49574

Krapfenbauer, Robert

ENVIRONMENTAL PROTECTION AND THE CONSTRUCTION OF THE RHINE VALLEY EXPRESSWAY SECTION BREGENZ. (*Umweltschutz und Verkehrshau bei der Rheintalautobahn Teilstueck Bregenz*). Text in German. Preprint, 6p. 1972. (Presented at the International Convention on Civilization Diseases, Nutrition, Environment, and Living Conditions, 18th, Berlin, West Germany, Sept. 16-23, 1972.)

The Rhine Valley motor highway project under construction at Bregenz comprises the length from the German-Austrian boundary at Laiblach to the connecting point at Dornbirn-Nord. Various routes were discussed to facilitate environmental protection. A sloping tunnel and a route along the slope of the Pfander mountain instead of around the outskirts of Bregenz were chosen. The section which runs parallel to Bregenz will be mostly overtunneled so that any exhaust gas emission which could be carried into the city by the prevailing winds is avoided. Air pollution in the city of Bregenz by traffic and enhanced by the meteorological conditions is so great that all measures must be taken to get traffic out of the city. The new expressway project will accomplish this. All through-traffic will be routed far from the city.

28134

APTIC NO. 49907

Lees, Lester, Mark Braly, Mahlon Easterling, Robert Fisher, Kenneth Heitner, James Henry, Patricia J. Horne, Burton Klein, James Krier, W. David Montgomery, Guy Pauker, Gary Rubenstein, and John Trjonis

SMOG. A REPORT TO THE PEOPLE. California Inst. of Tech., Pasadena, Environmental Quality Lab., National Science Foundation Grant GI-29726, Rept. 6, 1972. 62 refs.

A strategy for air pollution control in California is presented which could reduce the number of smoggy days 80% by 1975 and 90% by 1977. Engine and evaporation emissions from existing cars would be reduced by changing the fuel from gasoline to cleaner natural gas or propane; by retrofit devices

and engine modification; and by mandatory inspection and testing of vehicles. Socio-economic incentives such as taxes and special privileges for buses and car pools would reduce the use of motor vehicles. Nitrogen oxides, hydrocarbons, and other emissions from stationary sources would also be controlled. The cost of such a program is \$1 billion, or \$100 per capita for everyone in the South Coast Air Basin. The Clean Air Act of 1970 and Federal and State standards are discussed. Smog alerts would be called when the oxidant level exceeds 0.20 ppm or when early morning inversions and temperature indicate a high probability that this level would be exceeded. Economics of the conversion to gaseous fuels, the supply of gaseous fuels, and feasibility and costs of control devices for used cars are discussed. Improvements in air quality are projected. Sources and proposed control methods for sulfur dioxide and particulates are discussed.

28135

APTIC NO. 49210

Liston, Linda L.

MAINE: NATURE'S LAST STAND IN THE NORTHEAST. *Site Selection Handbook/72*, vol. 2, 16p., 1972.

In 1967, the Maine Department of Economic Development established Development Through Conservation as the goal of its development efforts. The approach seeks economic development for increased living standards, but at the same time insists on protecting the environment for its own aesthetic and economic values. Both objectives will be facilitated by Total Development Centers (TDC). These are large-scale legal and economic development mechanisms which allow massive inputs of capital investment, community planning, and diversified economic development beyond the capabilities of individual enterprise. In a TDC, capital investment in such items as site acquisition and preparation, roads, rail, power, and waste disposal will share by the various enterprises in the center. The centers will be developed on available vacant land and will be subject to stringent pollution standards. Proposed TDCs include a research and development complex, a potato processing complex, a paper production complex, and a specialty foods complex. Maine ambient air and water quality standards are given along with the provisions of the state Site Location Act.

28136

APTIC NO. 49211

Liston, Linda L.

KANSAS: TOTAL ENVIRONMENTAL DEVELOPMENT SYNCHRONIZES ECONOMIC DEVELOPMENT WITH CONSERVATION. *Site Selection Handbook/72*, vol. 2, 16p., 1972.

Kansas has initiated a Total Environmental Development plan to halt environmental abuse before it becomes a problem. The goal is to secure a viable economy for the state while maintaining a high quality environment. Therefore, Kansas is making a strong bid for clean, labor-intensive industry, including distribution, electrical and electronics, plastics, rubber, printing and publishing, mobile homes and recreational vehicles. In addition to its inherent advantages of location and available land, Kansas offers these industries programs to train skilled labor, an educational system designed to promote technologic advancement, and a wide choice of industrial financing mechanisms. The Kansas Department of Economic Development assembles economic information for companies considering a Kansas plant location and works closely with communities seeking to make themselves more attractive to industry. The State Department of Health is charged with establishing and enforcing standards for air and water quality and for control of solid wastes. Its activities in the field of agricultural pollution problems are discussed. Kansas air and water quality standards are given.

Liston, Linda L.

MARYLAND: A PACE-SETTING ENVIRONMENTAL PROGRAM. *Site Selection Handbook/72*, vol. 2, 16p., 1972.

Maryland is well organized to meet the challenge of environmental protection. Its department of Natural Resources, primary custodian of state land and waters, comprises eight operating agencies and 18 ancillary boards and commissions. The Department is responsible for administering a number of new environmental laws, including statutes dealing with water quality; wetlands protection; solid and liquid waste management; preservation of open space, scenic vistas, historic sites, and areas of environmental interest; hunting; and commercial and recreational fishing. The Department works closely with the Division of Economic Development, Department of Economic and Community Development, which is advocating incentives for industry to speed up use of the best pollution control devices. State-wide protection of air is a responsibility of the Bureau of Air Quality Control, Department of Health and Municipal Hygiene. Upon recommendations of the Bureau, the Department may issue injunctions against companies that violate air standards, rules, or regulations. More than 100 of the state's largest industrial polluters have been put on abatement schedules. A pollution abatement system at an aluminum plant is cited as an example of how state air standards can be met. Air and water quality standards are shown.

Nakada, Eiichi

EXISTING STATUS AND FUTURE OF PUBLIC NUISANCE CONTROL IN JAPAN. (*Waga kuni ni okeru kōgai kishoku no genjo to shorai*). Text in Japanese. *Jidosha Gijutsu* (Automobile Eng.), 26(9):1043-1050, Sept. 1972.

After Japan Environmental Agency was begun on July 1, 1971, the Air Pollution Control Law was amended, and authority to regulate permissible ranges of engine exhaust gas was transferred from Transportation Minister to Director of the Environmental Agency. Long range plans on permissible ranges of exhaust have been considered by the Central Pollutions Countermeasure Council, which determined the target of permissible range to be less than 2.1 g/km for carbon monoxide, less than 0.25 g/km for hydrocarbons, and less than 1.2 g/km for nitrogen oxides, for cars produced after April, 1975; and less than 0.25 g/km of NOx for cars produced after April, 1976, taking the Muskie Law into consideration. It means, in terms of 1600 cc class cars, reduction of 89% CO, 93% HC, and 92% NOx. It would be necessary to determine targets for automobiles other than passenger cars. A long range program is required to revise the overall transportation system, by putting different types of automobiles, including electric cars, steam engine cars, and turbine cars, to best use. The permissible range of exhaust gas for 1973 is being worked out at the moment, aiming at the figures given by the Transportation Technology Council. In 1973, NOx will be included for the first time, and all the HC emitted by automobiles will be controlled by 1973. To cope with photochemical smog, the Environmental Agency issued a directive to Prefectural governors on June 1, 1972, which includes strict measures to be taken during emergencies, periodical checks of automobiles, encouraging devices to control exhaust emissions, and monitoring of additives to gasoline, such as olefins and aromatic HC. Attaching catalysis-type cleaners of exhaust gas in the summer is encouraged by the directive issued on July 15, 1972.

Oya, Fumihiko, Akira Koguma, Yoshihiro Kitazawa, Nobuaki Kadoya, and Osamu Asai

PHOTOCHEMICAL AIR POLLUTION IN KANAGAWA (NO. 3). CONTROL SYSTEM AND PREVENTIVE MEASURE OF PHOTOCHEMICAL AIR POLLUTION.

AIR POLLUTION ABSTRACTS, JUNE 1973

(*Kanagawa-ken ni okeru kokagaku kōgai ni tsuite* (diasan-po), *kokagaku kōgai no kanshi taisai to hoshi taisaku ni tsuite*). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 79. (Nov. 7-9, Paper 27.)

A photochemical pollution countermeasures project team was organized in Kanagawa Prefecture in 1971, and working groups began to do some basic scientific research to establish basic control measures. The three working groups comprise the formation mechanism investigation team which examines toxic material in photochemical pollution, the formation mechanism, the continuous mobility and distribution of pollutants, meteorological factors, and emission sources; the investigation on the human effects investigates the medical effects of photochemical pollutants on the human body, the epidemiological study of photochemical pollutants on the human body, and the molecular structure and its effect on the body; the plant effect investigation team investigates the relationship between plant damage and photochemical pollution, and the workings of photochemical formation on plants. The methods of forecasting were evaluated in 1971 and reached the point of 80% accuracy. The forecasting system was adopted in June 1972. Forecasts for the day are given on television and radio in the morning; warnings and advice are given to school children, students, and gym teachers regarding the damaging effects of photochemical pollutants.

Ruckelshaus, William D.

PART 52-APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. *Federal Register*, 37(105):10842-10906, May 31, 1972.

Air Quality Implementation Plans for the 50 states, Washington, D. C., Guam, Puerto Rico, the U. S. Virgin Islands, and American Samoa, as required by section 109 of the Clean Air Act, are presented for standards for particulate matter, sulfur oxides, nitrogen dioxide, carbon monoxide, photochemical oxidants and hydrocarbons. Attainment dates for national standards, classifications of regions, possible extensions and requests for extensions of attainment dates, control strategy and regulations are specified.

Seinfeld, John H.

OPTIMAL LOCATION OF POLLUTANT MONITORING STATIONS IN AN AIRSHED. *Atmos. Environ.*, 6(11):847-858, Nov. 1972. 14 refs.

A mathematical approach to the problem of the optimal location of pollutant monitoring stations in a given airshed is presented. One possible criterion for locating a given number of pollutant monitoring stations is that the locations be chosen as those at which the concentration measurements are most sensitive to perturbations in source emission strengths. A theory and computational algorithm is developed whereby, assuming an airshed simulation model is available, the optimal locations of a given number of stations can be determined iteratively. The algorithm proposed actually encompasses the general problem of the optimal location of measurements both in space and time for a system governed by a set of parabolic or first-order hyperbolic partial differential equations. The theory is illustrated on the simple example of optimally locating one monitoring station downwind from a continuous, elevated crosswind line source.

Stern, Arthur C.

AIR POLLUTION - A WORLDWIDE PROBLEM REQUIRING A WORLDWIDE SOLUTION. *Pract. Environ. Control, Proc. Int. Congr. PRO AQUA-PRO VITA*, Basel, Switzerland, 1971, p. 116-141, 1972.

International and national organizations for air pollution control and their organization, meetings, and information exchange methods are reviewed. International organizations include the United Nations; United Nations Educational, Scientific, and Cultural Organization; The International Council of Scientific Unions; Economic Commission for Europe; World Health Organization; World Meteorological Organization; International Labor Office; International Atomic Energy Agency; and the U. N. Industrial Development Organization. The Organization for Economic Cooperation and Development, Council for Economic Cooperation, European Economic Community, Council of Europe, and North American Treaty Organization are international organizations of limited membership. Non-governmental groups include the International Union of Air Pollution Prevention Associations, European Federation of Chemical Engineering, and Conservation Group of Clean Air and Water in Western Europe. Air pollution can be classified as global, continental, national, urban, or local pollution. The global problem involves the effect of pollution on the temperature of the Earth and its atmosphere. The continental problem is that of transport of pollution across international boundaries. Within a nation, the problem is the build-up of the non-urban background pollution level. On the urban scale, the problems are the long-range strategy to keep pollution within acceptable levels and short-range tactics to cope with a stagnation-induced emergency episode. Much important international pollution is bi-national, principally involving two nations with a common border across which air pollution can flow. Training in air pollution has become international as students move from their home country to other countries for this purpose.

28143

APTIC NO. 49603

Tarabe, Motoji, Akira Murase, Himihide Matsumoto, and Toshiaki Inoue

SOURCE MONITORING SYSTEM IN KAWASAKI.

(Kawasaki shi ni okeru hasseigen arisan gasu jido kanshi shisutemu ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 129. (Nov. 7-9, Paper 84.)

The municipality of Kawasaki has planned a total plan for monitoring and controlling the sulfur dioxide emissions by city factories. Each factory was requested to install various meters for measuring SO₂ emissions. The total number of factories is 42, and the number of equipment is 272, which includes 157 oil flowmeters, 60 SO₂ meters, 10 gas flowmeters, nine coal meters, 13 sulfur analyzers, 18 oxygen meters, two emission gas flowmeters, and three air flowmeters. The measurements are registered at the output telemeter and received by the telemeter at the municipal pollution monitoring center. The data is analyzed at the central board every 15 min by scanning. The cumulative fuel consumption and total SO₂ emission and indexes are also obtained every 15 min. Each plant has various alarm and alert communication systems, and simultaneous and instant warnings can be conveyed from the monitoring center to the plant, and from the plant to the workers. These data are also published as hourly, daily, and monthly reports. The sign board in front of the city hall continuously indicates SO₂ emissions for each factory. The emergency fuel reduction enforcement for each factory and its operation can be also reviewed by the board. When this system is completed, 95% of the city's SO₂ emission can be monitored. In the future, suspended particulates and nitrogen oxides will also be monitored, and the present monitoring network will be enforced.

28144

APTIC NO. 49796

Thuiller, Richard H.

AIR MONITORING AND ITS APPLICATION TO LAND USE PLANNING. Preprint, Bay Area Air Pollution Control District, San Francisco, Calif., Technical Div., 7p., 1972. 1 ref. (Presented at the Conference on Methods in Air Pollution and Industrial Hygiene Studies, 13th, Berkeley, Calif., Oct. 30-31, 1972.)

Air monitoring activities and their application to land use planning are discussed. Land use regulations as an air pollution control technique are considered to be the logical culmination of the pollution control effort. A system is described whereby air monitoring techniques of defining air quality status, identifying, locating, and categorizing pollutant sources, obtaining a detailed inventory of their emissions, and defining the meteorological regime which determines the transport and dispersion of those emissions, can be utilized to test and evaluate various land use strategies and proposals against the requirements of air quality standards, and to determine the air quality impact of land use on a point by point basis throughout the designated region.

28145

APTIC NO. 49355

Weisburd, Melvin I.

FIELD OPERATIONS AND ENFORCEMENT MANUAL FOR POLLUTION CONTROL. VOLUME I: ORGANIZATION AND BASIC PROCEDURES. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Pub. APTD-1100, 258p., Aug. 1972. 40 refs.

NTIS: PB 213008

The basic parameters of air quality management, including the sources and classifications of pollutants; air pollution control strategies; legal aspects, rules, and regulations; and the organization and operating procedures of air pollution control agencies, including legislation, personnel requirements, enforcement procedures, surveillance, inspections, prosecuting variables, complaint handling, reports, hearings, and field evaluations are examined. The major air pollutants of concern to control agencies include particulates, sulfur oxides, organic and inorganic sulfur compounds, carbon monoxide, carbon dioxide, hydrocarbons (olefins and aromatics), nitrogen oxides, and photochemical products (oxidants, ozone, peroxyacetyl nitrate, and aldehydes). The meteorological parameters to be considered include air flow, topography, turbulence, stability ratings, atmospheric dispersion, plume behavior, and visibility. Inspection techniques are examined to define the procedures for identification, evaluation, and monitoring of the pollutant and the emission source.

1971

28146

APTIC NO. 49802

Clark, B. David and Robert G. Ireson

AIR MONITORING NEEDS FOR EMERGENCY EPISODES. Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Div. of Atmospheric Surveillance, 12p., 1971. 4 refs. (Presented at the Conference on Methods in Air Pollution and Industrial Hygiene Studies, Berkeley, Calif., Oct. 30-31, 1972.)

An outline of the design and functions of an emergency episode monitoring network is presented along with a description of the types of communication channels necessary for effective action. The local requirements of an area will determine the specific compromises which must be resolved. Cost, size of the area, technical expertise, available manpower, existing systems, episode potential, and time constraints must be considered. The ultimate success or failure of an emergency response system was measured by a single parameter -- effectiveness.

28147

APTIC NO. 49484

Fri, Robert W.

REQUIREMENTS FOR PREPARATION, ADOPTION, AND SUBMITTAL OF IMPLEMENTATION PLANS. Federal Register, 36(158):15486-15506, Aug. 14, 1971. 7 refs.

Regulations for preparation, adoption, and submittal of implementation plans by States for implementation, maintenance,

and enforcement of national air quality standards for sulfur oxides, particulate matter, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen dioxide, as required by the Clean Air Act, are presented. States are encouraged to consider the socio-economic impact and the relative costs and benefits of the various emission control strategies which can be employed to attain and maintain the national standards. Ambient concentration limits are 100, 60-100, and less than 60 micrograms/cu m as the annual arithmetic mean for sulfur oxide, and 95, 60-95, and less than 60 micrograms/cu m for particulate matter as the annual geometric mean, both for priorities I, II, and III, respectively. In Priority I regions, high volume samplers or tape samplers for 24-hour samples every 6 days for suspended particulates, pararosaniline or other method with one 24-hour sample every 6 days or continuous sampling for sulfur dioxide, nondispersive infrared or other methods for continuous sampling of carbon monoxide, gas phase chemiluminescence for continuous sampling for photochemical oxidants, and 24-hour sampling using the Jacobs-Hochheiser method for nitrogen dioxide should be applied for monitoring. The minimum frequencies of sampling for suspended particulates and SO₂ in Priority II and Priority III regions are a 24-hour sample every 6 days for both particulates and SO₂. Control methods, emission standards, and emission inventory data, are discussed for point sources, fuel combustion, solid waste disposal, manufacturing, and industries.

28148

APTIC NO. 49850

Gilmore, John S., William M. Beaney, Paul I. Bortz, Mary K. Duff, and Thomas D. Nevens

ENVIRONMENTAL POLICY ANALYSIS. PUBLIC POLICY INTERVENTION IN INTER-INDUSTRY FLOWS OF GOODS AND SERVICES TO REDUCE POLLUTION. PARTS I AND II. DEMONSTRATION, SUMMARY AND METHODOLOGY. (FINAL REPORT). Denver Univ. Research Inst. Colo., Industrial Economics Div., National Science Foundation Grant GI-11, DRI Proj. 4528, Rept. DRIIE-4528-71, 157p., Aug. 1971. 78 refs.

NTIS: PB 206875

A methodology is described which compares the effectiveness of alternative policies and programs responding to environmental problems. An example is used to demonstrate how state and local governments are attempting to implement Federal air quality standards. A Product Flow Model, based on OBE input-output tables, depicts product flow through the extraction-processing-marketing-use-disposal cycle. Petroleum refining is used as an example. A second model Hierarchy of Threats, Objectives, and Responses relates environmental problems to prospective solutions of increasing specificity. There are three phases. Industry Analysis offers an information base for identifying pollution problems and clarifies relationships between the study industry and its suppliers and customers. Response Analysis identifies existing and potential policy responses to the pollution or environmental threats under study. Policy Analysis identifies both technical and institutional remedies to pollution problems, and then compares alternative policies/programs for inducing adoption of the preferred remedies. It compares alternative policies and programs by the criteria of economic costs, social disruption, political resistance, administrative complexity, technological difficulty, and secondary environmental impacts. The methodology may also be useful in anticipating consequences of new applications of technology, in creating new approaches to solving environmental problems, and in considering many viewpoints before choosing one policy solution.

28149

APTIC NO. 49345

Montgomery, William David, III

MARKET SYSTEMS FOR THE CONTROL OF AIR POLLUTION. Harvard Univ., Cambridge, Mass., Dept. of Economics, Thesis (Ph.D.), Ithaca, N. Y., Cornell Univ., May 1971, 182p. 81 refs.

AIR POLLUTION ABSTRACTS, JUNE 1973

The conditions under which a system for property rights and market transactions (associated with air quality) will bring about the achievement of externally given air quality standards in an efficient manner were investigated. Only air pollution emitted by fixed industrial sources, each controlled by an independent profit-maximizing firm, is considered, thus fixing the spatial distribution within the air quality control region. Air quality management, examined within the context of emission standards, is investigated with respect to the origin and transmission of pollution, the nature and cost of abatement, regulations, markets in licenses to pollute, and the limits of markets. System assumptions and mathematical calculations are included.

28150

APTIC NO. 49955

Peskin, Henry M.

EQUITY AND ANTI-POLLUTION POLICY. Inst. for Defense Analyses, Arlington, Va., Program Analysis Div., Rept. P-777, 29p., March 1971. 20 refs.

NTIS: PB 201489

Three classes of anti-pollution policies are discussed with respect to the issues of fairness or equity. The classes are taxation of the polluter in proportion to the amount or value of the pollutant; setting a fixed permissible pollution level with enforcement backed by criminal penalties; and compensating the polluter financially to induce attainment of a desirable pollution level. The equity of these policies is compared by introducing two reasonable but conflicting equity criteria: the least harm criterion and the greatest compensation criterion. The ordinal ranking of the policies on equity grounds is reversed when one equity criterion replaces the other. The analysis is initially confined to a single polluter and single complainant, then extended to include multi-producer, multi-complainant problems.

28151

APTIC NO. 49485

Ruckelshaus, William D.

NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS. Federal Register, 36(84):8186-8201, April 30, 1971. 50 refs.

National primary and secondary ambient air quality standards are presented, and reference methods for the determination of the pollutants in ambient air are described. The national primary ambient air quality standard for sulfur dioxide is 80 micrograms/cu m as annual arithmetic mean, and 365 micrograms/cu m as a maximum 24-hour concentration not to be exceeded more than once per year. The corresponding values specified by the secondary standard are 60 and 260 micrograms/cu m. The primary standard for particulate matter specifies 75 micrograms/cu m as an annual geometric mean and 260 micrograms/cu m as a maximum 24-hour concentration. The corresponding secondary standards are 60 and 150 micrograms/cu m. The primary and secondary standards for carbon monoxide specify 10 mg/cu m as the maximum 8-hour concentration not to be exceeded more than once per year, and 40 mg/cu m as maximum 1-hour concentration not to be exceeded more than once per year. The primary and secondary standard for photochemical oxidants requires a value of 160 micrograms/cu m as the maximum 1-hour concentration not to be exceeded more than once per year. The primary and secondary standard for hydrocarbons is set at 160 micrograms/cu m as the maximum 3-hour concentration, which is not to be exceeded more than once per year. The primary and secondary standard for nitrogen dioxide is 100 micrograms/cu m as an annual arithmetic mean. Sampling, analytical, and calibration methods for these pollutants are outlined including pararosaniline/spectrophotometry for SO₂, high-volume sampling for particulates, non-dispersive infrared analysis for CO, anidimetric/spectrophotometric method for ozone and oxidants, gas chromatography for HC corrected for methane, and colorimetry for nitrogen dioxide.

SOCIAL ASPECTS

28156

1970

28152

APTIC NO. 49726

Committee on Public Works (U. S. Congress)

MANPOWER AND TRAINING NEEDS FOR AIR POLLUTION CONTROL. 91st Congress (Senate). Second Session, Doc. 91-98, 53p., June 1970.

Projected manpower, recruitment, and training needs of Federal, State, and local governmental agencies are reported. The programs through which the Department of Health, Education, and Welfare proposes to help meet these needs are described. Recruitment is the main obstacle to staffing State and local agency programs. Private industry and Federal agencies are expected to meet manpower needs through normal recruitment procedures. Programs which are to provide solutions to the problem of state and local recruitment, career development, and retention, include support for undergraduate and post-graduate training for agency employees, centralized job registers, and improvements in agency salaries and merit system classifications. Included in the report are: a predictive model for non-federal control agency manpower needs, salaries of state and local air pollution control personnel, vacancy rates of non-federal air pollution control agencies, manpower needs in the private sector, and a list of other federal training programs for the development of personnel.

1969

28153

APTIC NO. 49947

Janiszewski, W.

THE IMPLEMENTATION OF TASKS RELATING TO THE ATMOSPHERIC AIR CONSERVATION. *Air Conserv. (English translation from Polish of: Ochrona Powietrza)*, 3(2):1-14, 1969.

NTIS: TT 70-55123/2

The causes of the increase in air pollution over Poland include the formation of huge industrial agglomerations in mineral-rich regions, an increase in electric power generation and chemical processing, and a general increase in industrial development (industrial production multiplied 14 times between 1946 and 1965). Regulations and legislation have been passed for studying and reducing the increased pollution. A monitoring network using standardized measurement methods is being developed and will be applied to a study of the influence of meteorologic factors. The greatest sources of pollutants such as dust and sulfur dioxide are mining, power generation, heavy industry and machinery production, chemical production, and forestry and wood processing. Maintenance, process modifications, special equipment, and high stacks can be used to reduce pollution. Guidelines for future research are given. A national plan for installing air pollution control equipment earmarked \$25 million to be spent in some 200 plants. The administration and implementation of the control plan are mentioned. Emission data by industry and geographical area are included.

SOCIAL ASPECTS

1972

28154

APTIC NO. 49517

Hirose, Kazutoyo, Yoji Sano, Chiharu Sano, and Katsuhiko Koizumi

INVESTIGATION OF THE ATMOSPHERIC POLLUTION IN SAITAMA PREFECTURE. NO.3: CORRELATION BETWEEN THE EXTENT OF ATMOSPHERIC POLLUTION AND FACTORS OF SOCIAL CIRCUMSTANCES. (*Saitama-ken ni okeru taiki osen no chosa kenkyu daisan-*

po SOx to NOx to shakai teki yoin to no kankei). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 179. (Nov. 79, Paper 134.)

The correlation between air pollutants and social factors is essential in the planning of city and public health. The social factors include the natural environment; altitude; inclination; topography; density; utilized land; fluctuation in land utilization; commercial, residential, and industrial areas; public facilities; rice fields; vegetable fields; orchards; topographical divisions; railroad and highway networks; forestry, groves, parks, and green areas, and rivers. Also, a census should be taken. Census includes population, the number of office buildings, business population, manufacturing population, manufacturing plants, residences, wooden houses, and non-wood houses. Analyses of these backgrounds and pollutants, and these factors and meteorological conditions were made.

28155

APTIC NO. 49897

Lave, Judith R., Lester B. Lave, and Eugene P. Seskin

MIGRATION AND URBAN CHANGE. Preprint, International Economic Assoc., 47p., 1972. 47 refs. (Presented at the International Economic Association, Urbanization and Environment Meetings, Copenhagen, Denmark, June 1972.)

Some of the causes of population change in major cities are investigated. Population change can be characterized as the sum of four processes: rural-urban migration; movement from one city to another; birth and death rates; and movement from central city to the area within the Standard Metropolitan Statistical Area (SMSA) but outside the major city. Each of these four processes is examined, citing relevant literature and exploring some of the models which have been developed to characterize the processes. A utility maximization model for the household is used to motivate the empirical study of rates of migration from central city to ring for 71 SMSAs. This migration is important in the American context because of the different fiscal responsibilities and revenue raising capabilities that exist across the political boundaries. The migration data make it clear that large cities are losing whites and upper income families while they are gaining nonwhites and lower income families. Movement to the ring from central city is influenced by the urban environment, that is crime rates, air pollution, and population densities. Economic factors, such as job opportunities and tax rates, are also important. Migration trends in the future are considered.

1969

28156

APTIC NO. 49832

Swan, James Albert

AN ANALYSIS OF ATTITUDES AND COPING STRATEGIES OF HIGH SCHOOL YOUTH RESPONSE TO AIR POLLUTION. Michigan Univ., Ann Arbor, Environmental Science Dept., Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1969. 180p. 48 refs.

New instruments for assessing attitudes and coping responses to air pollution were developed and tested, and factors influencing these attitudes and coping responses were studied. The study was conducted in April and May of 1969, at MacKenzie High School in Detroit, Mich., with 173 senior boys. Concern for air pollution was measured by a forced choice questionnaire with a 20-point scale of concern. The mean concern score was 12.8. Air pollution control was chosen more often than all other environmental and social problem solving programs it was paired with, except increasing job opportunities and improving police-community relations. Positive correlation was obtained between concern of air pollution and visual awareness of air pollution, as studied with a photographic technique. No significant relationship between concern for air pollution and technical knowledge of air pollution was evidenced. Gaining simulation consisting of a series of alterna-

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tive activities which might be undertaken to convince a local city council to pass an air pollution control ordinance was conducted with 35 subjects of normal intelligence who were highly concerned about air pollution. Significant correlations were obtained between exploration, internal-external control, and interest in local community problems. None of these independent variables, however, were significantly correlated with performance on the simulation.

GENERAL

1973

28157

APTIC NO. 49232

AIR, VENTILATION AND HEALTH AT WORK. (Luft, Lueftung und Gesundheit im Betrieb). Text in German. *Oel Gasfeuerung*, 18(1):34-38, 1973.

Fresh air consists of 78% nitrogen, 21% oxygen, 0.03% carbon dioxide, and small quantities of rare gases. Man breathes about 20,000 times per day. It is obvious that the proper composition of air and the absence of dust, chemicals, and other pollutants are important to man's wellbeing. The average dust concentration in rural air is nowadays about 0.02 mg/cu m, in the suburbs 0.05 to 0.5 mg/cu m, in cities 0.5 to 1.5 mg/cu m, in urban streets 1 to 3 mg/cu m, and in industrial areas 0.5 to 5 mg/cu m. Great attention is being paid recently to any possible connection between the extent of air pollution and lung cancer. Final statistical results to confirm this assumption have to be furnished. The importance of fresh and unpolluted air at working places is briefly discussed.

1972

28158

APTIC NO. 49170

Ortega Torres, J.

CONTAMINATION OF THE ATMOSPHERE. (Contaminacion Atmosferica). Text in Spanish. *Am. Med. Acad. Ciencias Med. Cataluna*, 58(2): 147-165, April 1972. (Presented at the *Asociacion de Microbiologia, Higiene y Medicina Preventiva*, Dec. 17, 1971.)

The air pollution phenomenon is discussed in terms of definitions, causes, effects on human health and economy, control, and reevaluation of certain attitudes of modern man. The main air pollutants such as sulfur dioxide, hydrogen sulfide, hydrogen fluoride, nitrogen oxides, aldehydes, carbon monoxide, and polynuclear hydrocarbons, resulting from combustion of sulfur-containing fuels, petroleum refineries, aluminum producing plants, fertilizer manufacturing, and traffic are reviewed. The photochemical mechanism of smog formation is discussed along with the meteorological and orographic factors involved in enhancing the process. The air pollution-induced pathology is reviewed and illustrated by the classical episodes

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recorded in the Meuse-Valley at Donora, at the Baltic Sea, and in Mexico. Los Angeles is referred to as the city with 262 days/yr of thermal inversion incidence. Air pollution monitoring in terms of sampling and analytical methods is discussed along with control possibilities. The latter are reviewed in terms of fuel improvement, combustion process improvement, technological process modifications, and emission control treatment. All the aspects involved in the air pollution control process should be supervised by appropriate administrative authorities. Maximum local autonomy should be given in terms of correlating the source with the orography and the climatology and the possibilities of controlling pollution. Special associations should campaign in educating and in trying to explain the real hazards caused by pollution. Because of the wide range of unknowns involved, national and worldwide cooperation between science, technology, industry, economy, and law should be established. The modern man should become aware of the threat to the environment caused by affluent living and try to save the environment before its deterioration becomes irreversible.

1971

28159

APTIC NO. 49092

O Leary, John F.

THE ENERGY CRISIS—SOME IMPLICATIONS AND ALTERNATIVES. Preprint, American Assoc. for the Advancement of Science, Washington, D. C., 10p., 1971. (Presented at the American Association for Advancement of Science, Annual Meeting, 138th, Philadelphia, Pa., 1971.)

Exponential growth rates have created demands for conventional fossil fuels that threaten the exhaustion of low cost oil and gas resources in the United States in the relatively near future. Inadequate provision has been made for synthetic fuels to take the place of these naturally occurring resources. In consequence, the U. S. faces a period of rising real costs for energy and increasing constraints arising from the energy sector on freedom of environment, economic, and political action. Demands for energy are so closely linked to increases in standards of living and in the gross national product that the demand for fossil fuels has been subject to an inexorable geometry all its own. Energy requirements and future trends in consumption are indicated. The inefficiency of the energy system and the tendency not to look at the problem objectively are considered. Virtually all of the information of a statistical nature that is available with regard to energy resources is the product of parties of interest. There is a clear and absolute requirement for the developing of an independent source of data relative to energy developments so that a factual background will be available for devising appropriate action programs. In addition, failure to support adequate programs of energy research has resulted in a radical narrowing of options with regard to energy provisions. Two areas for optimism are the gradual increase in public awareness of the problem and the availability within this country of the skills that are necessary to provide solutions.

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49689	49690	49691	49692	49693	49694	49695	49696	49697	49699	49700	49701	49702	49703
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49970	49971	49972	49973	49974	49975	49976	49977	49978	49979	49980	49981	49982	49983
49984	49985	49986	49987	49988	49989	49990	49991	49992	49993	49994	49995		